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WEED ABSTRACTS

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NOTES FOR READERS

Weed Abstracts endeavours to provide a comprehensive coverage of the world's literature on weeds, weed control and closely allied subjects. To this end, over 370 journals and nearly 100 annual reports are regularly searched. Other journals, reports, bulletins, etc. are abstracted as they are seen. Additional coverage is obtained through agreements with other abstracting organisations.

Abstractors

P.J. Boyle (Editor)
P. Crosfield
J.W. Frampton
D.M.L. Sparrow

Correspondence about subscriptions to Weed Abstracts should be addressed to: The Treasurer, British Weed Control Council, c/o National Association of Corn and Agricultural Merchants, Cereal House, 58, Mark Lane, London, E.C.3. Other correspondence should be addressed to: Information Section, A.R.C. Weed Research Organisation, Department of Agriculture, Parks Road, Oxford.

As far as possible the journal abbreviations used are those given in the World List of Scientific Periodicals. Holding libraries in Oxford and elsewhere are also taken from the World List, e.g. O.BO. = Botany Department, Oxford. Numbers at the end of abstracts e.g. 75(492) are for internal use only.

When a paper is by more than one author, the address of the first author only is given.

Where an abstract is taken from an abstracting journal the acknowledgement follows the abstract, e.g. Herb.Abstr., 2,163. Where it is quoted only in part the acknowledgement is preceded by the word "from", e.g. From Biol.Abstr., 2,294.

The Information Section is always pleased to receive comments and suggestions for the improvement of Weed Abstracts.

* An asterisk before the author's name indicates that only the title of the paper has been seen.

Continued from the inside back cover.

ac	- acre(s)	in.	- inch(es)	p.s.i.	- pounds per square inch
a.e.	- acid equivalent	kg	- kilogram(s)	v/v	- volume/volume
a.i.	- active ingredient	l	- litre(s)	w/v	- weight/volume
cm	- centimetre(s)	lb	- pound(s)	w/w	- weight/weight
d.b.h.	- diameter at breast height	m	- metre(s)	>	- greater than
		ml	- millilitre(s)	<	- less than
ft	- foot(feet)	oz	- ounce(s)	#	- pounds per acre
g	- gram(s)	post-em.	- post-emergence	±	- with or without
gal	- gallon(s)	pre-em.	- pre-emergence		
ha	- hectare(s)	p.p.m.	- parts per million		

Language abbreviations: an initial capital denotes the language of the article, a small letter that of the summary:- Dan.- Danish, Du. - Dutch, E. - English, F. - French, G. - German, It. - Italian, Jap. - Japanese, Nor. - Norwegian, Russ. - Russian, Span. - Spanish, Sw. - Swedish.

212. FOY, C.L. (Dep.Bot., Univ.California, Davis, U.S.A.) Weed control in agronomic crops - a report of progress. Proc. 12th ann.Calif.Weed Conf., 1960, 66-72.
The following current field trials are described: (1) sugar beet, involving 10 herbicides and 4 methods of application; (2) small-seeded legumes; (3) small grains; (4) maize and sorghum; (5) safflower; and (6) on irrigated pastures. In the first 5 classes, soil incorporation of endothal and EPTC pre-sowing at 3-4 ½ gave effective control of annual grasses, as did diuron. On irrigated land rates required were much lower. - P.C. [O.W.]

213. GREAT BRITAIN, MINISTRY OF AGRICULTURE, FISHERIES AND FOOD. Choosing selective weed-killers for cereals. Adv. Leafl.Minist.Agric.Fish.Fd, 1960, 315, pp.8.
Recommendations are given for the use of MCPA, 2,4-D, MCPB, 2,4-DB, mecoprop, MCPA/2,3,6-TBA, DNOC and dinoseb in cereals. - P.J.B. [438(42)]

214. MEADLY, G.R.W. (Dep.Agric., St. George's Terrace, Perth, W.Australia). Weed control in cereals - some recent developments. Proc.2nd Aust.Weeds Conf., 1960, Pap. 37, pp.8, tabs.2, bibl.2.
A review dealing with the tolerances under W. Australian conditions of wheat, oats and barley at different stages of growth to various formulations of 2,4-D and MCPA at different volume rates (including very low volumes for aerial spraying), with particular reference to Brassica tournefortii and Raphanus raphanistrum which are the most prevalent weeds. Tolerances for cereals undersown with Dwalganup subterranean clover are also discussed. - D.M.L.S. [O.W.]

215. KRAMER, W. and HEUSCHMID, W. (Inst.Phytopath., Karl-Marx Univ., Leipzig, Germany). Answertung eines Unkrautbekämpfungsversuches mit einigen groszgernten und vorschiedenen Herbiziden. [Evaluation of a weed control experiment with large apparatus and various herbicides.] Proc.Weed Conf.zent.biol. Anstalt.Berlin, 1959, 81-95, (G.russ.e.), figs.1, tabs.7, bibl.3.
DNOC, 2,4-D and MCPA sprays were tested at 200, 400 and 600 l/ha and also as dusts in large-scale weed control experiments in summer cereals, mainly oats. These rates showed no significant difference in effect. - P.C. [O.W.]

216. CUTHBERTSON, E.G. (Agric.Res.Inst., Wagga Wagga, N.S.W., Australia). Chemical control of skeleton weed (Chondrilla juncea L.) in wheat in relation to yield. Proc.2nd Aust.Weeds Conf., 1960, Pap. 43, pp.8, tabs.4.
The effect of suppressing C. juncea upon wheat yield components was studied during 3 seasons. Spraying the fallow (with 2,4-D sodium 1 ½) before sowing tended to increase grain yields by increasing ears/unit area and grains/ear. Spraying in spring at the normal time prevented yield loss by alleviating water stress and thus maintaining grain weight at a high level. It is concluded that, whereas the absolute magnitude of grain yield is determined by year to year variations in rainfall, weed control sprays must be applied both to the fallow and to the crop (in spring) to obtain maximum seasonal yield. - Author's summary (modified). - D.M.L.S. [O.W.]

217. FEYERABEND, K. (Biol.Zentralanst., Kleinmachnow, Berlin, Germany). Engelnisse aus Unkrautbekämpfungsversuchen in Maiz 1958. [Results of weed control experiments in maize, 1958.] Proc.Weed Conf.zent.biol. Anstalt., Berlin, 1959, 31-4, (G.russ.e.)
The results of experiments on weed control are described, using 2,4-D and DNOC at 1.5 kg/ha. Some crop damage occurred, but yields were higher than on untreated plots. (See also Weed Abstracts, 8,750). - P.C. [O.W.]

218. JOHNSTON, A.M. and CAYZER, E.P. (Agric. Ser.Pty Ltd., 28 Bungaree Rd, Pendle Hill, N.S.W., Australia). Pre-emergent weed control in maize. Proc.2nd Aust.Weeds Conf., 1960, 45, pp.4, bibl.5.
In a number of trials in New South Wales and Queensland, all varieties of maize tested were tolerant to both simazine and atrazine up to 5 ½. Simazine was less effective post-em. except when heavy irrigation followed treatment; results from the 2 pre-em. treatments were comparable. Echinochloa crus-galli and Cenchrus echinatus were relatively tolerant to simazine and susceptible to atrazine, no doubt because of the growth penetration of atrazine to the root zone. Neither controlled deep-rooted field bindweed [Convolvulus arvensis]. Results were

consistently satisfactory when soil moisture was at or near field capacity at the time of spraying, and poor when the soil was dry, even if rains followed later. Band-spraying was more effective when done directly behind the seed drill than when done some hours later.

Under irrigation conditions on river alluvial soils, band spraying with inter-row cultivation was preferable to overall spraying. On chocolate soils of a self-mulching type, broadcast spraying and no cultivation is recommended. For both compounds rates of 2-3 # in 20-25 gal/ac are recommended to control weeds for 6-8 weeks after sowing. - D.M.L.S. [O.W.]

219. UNITED STATES, STAUFFER CHEMICAL COMPANY. Eptam - rice. Fact Sheet, Stauffer Chem.Co., [n.d.], pp.4.

The results are given of 2 research and 2 commercial grower trials in California in 1960. In the first research trial, Eptam 6E (EPTC) and Eptam Analog R1607-6E at 1, 2 and 4 # a.i. were applied pre-sowing and immediately incorporated with a spike-tooth harrow, once over, after which the area was flooded and rice sown broadcast on the following day (15th May). As assessed on 27th July, rates of 1 and 2 # of both herbicides, respectively, gave poor to fair and fair to good control of Echinochloa sp. 4 # gave excellent control of Echinochloa sp. and caused very slight injury to the rice in the case of Eptam 6E and moderate to severe injury with R-1607-6E. In the second research trial, EPTC 2 and 4 # was incorporated immediately with a harrow, once over. The area was then flooded and rice sown immediately, or 3, 6 or 13 days later. Some crop injury was noted when the rice was sown immediately after flooding, though this was slight with 2 #. With all but one treatment control of Echinochloa was classed as excellent; with the exception, control was classed as good. With the 4 # rate, crop injury declined as the delay between flooding and sowing increased and was nil with a delay of 13 days. In 2 grower trials Eptam 6E at rates of 3 and 4 # applied 2 and 4 days before sowing rice in mid-April gave excellent control of Echinochloa sp. at the end of July. In trials in France, Eptam at 3-4 # was applied 8, 14 and 20 days before sowing rice on 15th-30th April. As assessed in late June, control of Echinochloa sp. was excellent in all cases. Moderate injury to the rice was caused in some cases when the rice was sown 8 and 14 days after Eptam treatment. Eptam applied to very wet soils has caused injury to the rice in some cases and weed control has been poor. The relationship between the zone of node formation in rice and Echinochloa and their respective reactions to EPTC is noted. - P.J.B. PO.W.]

220. VASCONCELLOS, J.C. Sementes estranhas do arroz. [Weed seeds in rice.] Publ.Minist.Econ., Com.reg.Comercio Arroz, 1958, pp.29, (Purtuguese.e.), figs.24, tabs.3, bibl.13.

Seeds of the most important rice weeds in Portugal are described and illustrated, and the distribution of these weeds in the principal rice-growing areas tabulated. - D.M.L.S. [1(46.9)]

221. VASCONCELLOS, J.C. Evolucao da vegetacao infestante dos arrozais no concelho de Alcacer do Sal. [Evolution of weeds in the ricefields in the municipality of Alcacer do Sal.] Publ.Minist.Econ., Com.reg.Comercio Arroz, 1959, pp.36, (Portuguese.e.), tabs.7, bibl.17.

Inventories of weeds in ricefields of Alcacer do Sal (Portugal) taken on 6 dates between 21st April and 17th September inclusive, are recorded and the results compared with those of similar researches in Azambuja. - D.M.L.S. [2(46.9)]

222. * QOSJA, X. Les mauvaises herbes dans les plantations de Riz. [Weeds of rice crops.] Tirana.U.Shteteror.B.Ser.Shkencat Natyrore, 1959, 13,(1),66-80, (Albanian.f.)

223. * STOICHEV, O.A. [Chemical weeding of flax.] Zashch.Rast.ot Vred.i Boleznei, 1960, (1), 26, (Russ.)

224. GREAT BRITAIN, MINISTRY OF AGRICULTURE, FISHERIES AND FOOD. Sugar beet cultivation. Bull.Min.Agric.Fish.Fd, 1960, 153, pp.114, 8/-.

A special contribution on chemical weed control is included. - D.M.L.S.

225. BANDEEN, J.D., JONES, G.E. and SWITZER, C.M. (Ontario Agric.Coll., Guelph, Canada). An investigation of the effects of various methods of herbicide application on weed control in sugar beets. Proc.Amer.Soc.Sug.Beet.Technol., 1960, 11.(2),151-4, tabs.1, bibl.5.

EPTC at 2, 4 and 6 # and endothal 4, 6 and 8 # were applied to sugar beet as follows: (a) pre-em. surface application, (b) pre-sowing, with incorporation into the soil with a spike-tooth harrow, (c) as (b), but a spring-tooth cultivator used for incorporation, (d) as (b), but with a double disc. All plots were harrowed and packed after the pre-sowing soil incorporation treatments and the herbicide was always incorporated into the soil immediately after application, with seed sown 2 days later. Weeds present were mostly Amaranthus retroflexus, Chenopodium album and Echinochloa crus-galli. Endothal gave unsatisfactory weed control with all rates and methods of application. EPTC pre-em. gave no weed control, but was considerably more effective pre-sowing. Incorporation of EPTC with the double disc and spike-tooth harrow gave significantly better control of broad-leaved weeds than the spike-tooth harrow, but control of grass weeds was not affected. Crop injury was severe with EPTC 6 # and the 2 # rate with treatments (c) or (d) was considered best. -P.J.B. [240(71)]

226. BAUDOIN, J.D., JONES, G.E. and SWITZER, C.M. (Ontario Agric.Coll.,Guelph, Canada). Further studies on the control of weeds in sugar beets with herbicides. J.Amer.Soc.Sug.Beet Technol., 1960, 11,(2), 160-3, tabs.2,bibl.1.

In trials in 1959 at Guelph, the following herbicides were applied in 30 gal spray either as pre-sowing treatments on 12th May, then incorporated into the soil by means of a double disc, followed by a spike-tooth harrow and packer, and the crop sown on the following morning, or pre-em. on 12th May after sowing on 11th May: EPTC, liquid and granular formulations, monuron, diuron, endothal as water-sol., as oil suspension and as granular formulations, GC 2603 (3-phenyl-1,1-dimethylurea) trichloroacetate, CP 6936 (α-chloro-N-ethyl-N-phenylcarbamate), Niagara 5996 (not specified), CDEC and chlorpropham + CDEC. Of pre-sowing treatments, endothal granular at 2 # a.i. was considered the most satisfactory, while EPTC liquid was ineffective in both trials. Monuron and diuron at 0.5, 0.75 and 1 # and GC 2603 at 2 and 3 # gave excellent weed control, but caused considerable crop injury. The water-sol. and oil formulations of endothal gave very erratic results. Endothal granular was superior to the other formulations, especially when applied pre-sowing, though it caused slight crop stunting. CP 6936 (4, 6 and 8 #) was effective against weeds as a pre-em. treatment and caused little crop injury, but caused more crop damage when applied pre-sowing. CDEC 6 # and chlorpropham 2 # + CDEC 4 # pre-em. gave satisfactory weed control, but the latter caused slight crop injury. The weeds present were mostly Chenopodium album, Amaranthus retroflexus and some annual grasses. - P.J.B. [241(71)]

227. BAUDOIN, J.D. (Ontario Agric.Coll., Guelph,Canada). Chemical weed control in sugar beets is now possible. Proc.7th ann. Meet.Agric.Pest.Tech.Soc., 1960, 78-80.

Suggested recommendations are: EPTC 2-3 # a.i. pre-em. applied to the soil surface and incorporated immediately with a double disc; CDEC 4-6 # a.i. or endothal 6-8 # a.i. applied to the soil surface pre-em. - P.C. [O.W.]

228. MAJUS, H. (Bayerische Landesanst. Pflanzenb.in Pflanzensch.,Munich,Germany). Unkrautbekämpfungsversuche mit Herbiziden im bayerischen Zuckerrübenbau. [Weed control research with herbicides in Bavarian sugar beet culture.] Pflanzenschutz, 1959, (3), pp.6, tabs.2,bibl.4.

See Weed Abstracts, 8,1613. [266(43)]

229. ISLEIB, D.R. (Michigan Agric.Exp.Sta., East Lansing,Michigan,U.S.A.) Quackgrass control in potato production. Weeds, 1960, 8,(4),631-5.

In trials in Michigan, dense swards of Agropyron repens, customarily cut for hay, were subjected to the following treatments before being planted to potatoes: in 1955 sprayed in mid-May when A. repens growth was about 12 in. high, followed by cultivation and planting to potatoes; in 1956 and '57, 0 or 40 lb N/ac in early May, followed by spraying at about 3 weeks later and planting to potatoes in early June. Herbicidal treatments in 1955 were dalapon 10 #, TCA 20 # and MH 4 #, and in 1956-7 dalapon 10 and 15 #, TCA 20 #. Excellent control of A. repens was given by the dalapon and TCA treatments, but not by the MH. Control was improved by increasing the number of pre-planting cultivations from 1 to 3. Applying N before spraying did not improve control. Yields of tubers were increased more where A. repens was controlled by herbicides than where cultivations, only, were used. - P.C. [O.W.]

230. MARLOW, H. (Inst.Pflanzenzüchtung, Quedlinburg,Germany). Die Unkrautbekämpfung in Erbsenkulturen unter besonderen Berücksichtigung chemischer Mittel. [Weed control

in pea crops with special regard to chemical means.] Proc.Weed Conf.zent.biol.Inst.Anstalt. Berlin, 1959, (G.russ.e.), 35-42, figs.1.
Mechanical and chemical methods of weed control in peas are described. Frequent and early hoeing, followed by applications of DNOC or dinoseb 600 l/ha at concentrations of 0.6-0.7%, have given the best results. Applications were made when the plants were dry and 10-15 cm high. - P.C. [O.W.]

231. RAWSON, J.E. (Div.Plant Industry, Dep.Agric., William St., Brisbane, Queensland, Australia). The susceptibility of the Virginia Bunch peanut variety to post-emergence application of phenoxyacetic and phenoxybutyric growth regulators. Proc.2nd Aust.Weeds Conf., 1960, Pap.25, pp.8, figs.1, bibl.3.
The results are given of trials during 4 seasons in which 2,4-D and 2,4-DB at rates up to 1.5 # and MCPA and MCPB at rates up to 1 # were applied post-em. at 1 to 16 weeks after emergence. 2,4-D and 2,4-DB both reduced yield in proportion to the rate of application, the mean yield reduction for 2,4-D being ca.3.5% for each oz and for 2,4-DB ca.0.45% for each oz. Visible crop injury indicated that susceptibility is lowest 1 week after emergence and highest at 6 weeks after emergence. Injury from applications 12 weeks after emergence was not severe, but in 1 trial yield reduction was greater from 2,4-D applied at 16 weeks than at 4 weeks after emergence. In the trial where both were tried there was no difference between the effect of the sodium and amine salts of 2,4-D; there was also no significant difference between 2,4-D and MCPA in terms of yield and no difference in the visible effects of 2,4-DB and MCPB. In 1 trial neither 2,4-D nor MCPA, each at 6 oz/ac, reduced the yield of Red Spanish variety. Good control of Xanthium pungens was obtained with 2,4-DB and MCPB at 8 oz/ac. The economics of using 2,4-DB and MCPB is discussed and the use of these herbicides for the control of susceptible broad-leaved weeds recommended. 2,4-D and MCPA should only be used where weeds can be controlled by rates so low that yield reductions are negligible (e.g. against Ipomoea sp.which can be controlled with ca. 1 oz 2,4-D/ac). - D.M.L.S. [O.W.]

232. KIRINDE, S.T.W. (Dry Zone Res.Sta., Maha Illuppallama, Ceylon). Some effects of IPC and CIPC on groundnuts. Trop.Agriculturist, 1959, 115, pp.7, figs.2, tabs.3.
Groundnuts were sown in pots and treated with propham and chlorpropham dust at 1 # a.i. pre-em., at emergence, at the 4-leaf stage (7-8 days post-em.), at the 5-leaf stage (14-15 days post-em.), and at flowering. Propham pre-em. reduced germination, and depressed yields of groundnuts if applied before the 4-leaf stage. Chlorpropham caused stunting, chlorosis and leaf-curl, and depressed yields at whatever stage of growth application was made. Propham and chlorpropham were not considered worth extended trials for use as weedkillers in groundnuts. - P.C. [3(548.7)]

233. HARRIS, V.C. (Mississippi Agric. Exp.Sta., State Coll., Mississippi, U.S.A.) Weed control in cotton over a ten-year period by use of the more promising materials and techniques. Weeds, 1960, 8, (4), 616-24, tabs.5.
In a 10 year experiment on weed control in cotton, the following compounds were evaluated as pre- and post-em. herbicides: Lion Herbicidal Oil 1 (LHO 1), dinoseb, monuron, diuron, chlorpropham, 2,4,5-TES and N-(3,4-dichlorophenyl)methylacrylamide. Cotton plants were scorched by dinoseb and N-(3,4-dichlorophenyl)methylacrylamide, but diuron 1 # pre-em. + 1 # post-em. resulted in excellent weed control and was the best of those tested. The cost of the herbicide was less than that of hand hoeing but the latter resulted in slightly higher cotton yields and net returns than the combination of pre- and post-em. herbicides. All herbicides were band-sprayed. N-(3,4-dichlorophenyl)methylacrylamide applied as a post-em. directed spray showed promise. - P.C. [O.W.]

234. * POINTEL, J.G. Les herbicides en culture cotonniere. [Herbicides in cotton crops.] Agron.Trop.(Paris), 1960, 15, (1), 38-46.

235. NOUR, M.A. (Fac.Agric., Univ.Khartoum, Shambat, Sudan). On "leaf curl" of cotton in the Philippines. F.A.O. Plant Prot. Bull., 1960, 8, (5), 55-6.
A destructive, leaf-curl condition of cotton observed in the Philippines has been attributed there to a virus transmitted by Bemisia gossypiperda (= B. tabaci). The present author adduces evidence to support his contention that the symptoms are not characteristic of leaf-curl virus as observed in the Sudan and that the symptoms

are, in fact, typical of those caused by 2,4-D drift. - J.W.F. [G.R.I.]

236. BURCALOW, F.V. (Univ.Wisconsin, Madison,U.S.A.) Pasture renovation with Dowpon. Down to Earth, 1961, 16,(3),9-10.
A programme for renovating permanent pastures, using dalapon for killing the sward, is outlined. - P.J.B. [O.W.]

237. ANNAND, A.M. and MACEY, M.J. (Union Carbide Australia Ltd.) Response of irrigated seedling clover pasture to substituted phenoxyacetic and phenoxybutyric acid herbicides. Proc.2nd Aust.Weeds Conf., 1960, Pap. 27, pp.10, tabs.3,bibl.7.
The application of 2,4-DB at 0.25, 0.5 and 1 lb. to a weedy, irrigated stand of seedling white clover and red clover resulted in greater yields 6 months later than did MCPB at equivalent rates. 2,4-DB at 1 lb. was better than at lower rates and increased yields more than did 2,4-D or MCPA at 0.25 or 0.375 lb. Ester and amine salts behaved similarly throughout the trial. - Authors' summary. [O.W.]

238. JOHNSTON, A.N. and CAYZER, E.P. (Agric.Serv.Pty Ltd.,28 Bungaree Rd,Pendle Hill,N.S.W.,Australia). The interactions of certain herbicides and herbicide mixtures on Paspalum dilatatum (Poir.) Proc.2nd Aust. Weeds Conf., 1960, Pap. 49, pp.9, tabs.1.
A trial is described in which the following were applied to P. dilatatum after flowering: amitrole 4 and 10 lb., amitrole 10 lb. + ammonium thiocyanate 10 lb., dalapon (sodium) 12 and 20 lb., and amitrole 4 + dalapon (sodium) 12 lb. The variations in symptoms of toxicity, speed of action and growth response are described. The results indicated possible physiological interactions and a synergistic herbicidal effect between amitrole and dalapon (sodium) in P. dilatatum when these two were applied as a mixture. - D.M.L.S. [O.W.]

239. MICHAEL, P.W. (Div.Plant Industry, C.S.I.R.O.,Canberra,Australia). The control of thistles (Silybum and Onopordum) by perennial pasture species. Proc.2nd Aust. Weeds Conf., 1960, Pap. 6, pp.12, tabs.7.
Lucerne completely suppressed and Phalaris tuberosa effectively controlled S. marianum after the first year of establishment, whereas annual forage species were ineffective. Autumn rather than spring sowing is recommended, also the use of 2,4-DB to reduce weed competition in the year of establishment. Against Onopordum spp. (O. acanthum, O. illyricum and hybrids), Dactylis glomerata was the most successful of the perennial grasses tested (the others were P. tuberosa, Lolium perenne, Festuca arundinacea, and Bromus inermis) and autumn sowing was again more successful than spring. Amitrole at 0.5 lb. applied to the young grasses greatly depressed numbers and yields of Onopordum spp. and increased grass yields. - D.M.L.S. [O.W.]

240. SMITH, L.W. (ICIANZ Ltd.,Merrindale Biol.Res.Sta.,Dorset Rd,Croydon,Victoria, Australia). Chemical weed control in lucerne. Proc.2nd Aust.Weeds Conf., 1960, Pap. 38, pp.6, tabs.2 bibl.11.
When sprayed at the 4- to 6-leaf stage dalapon or 2,4-DB at 1 lb. caused no injury to seedling lucerne, but dalapon 2 and 4 lb. and mixtures containing more than 0.5 lb. of 2,4-DB + dalapon 1 lb. were injurious. Seedling lucerne was very susceptible to 2,4-DB at the 1- to 2-leaf stage and at the 3- to 5-leaf stage but not at the 4-5 or 6-7 leaf stages. Mature lucerne was not injured by dalapon at rates up to 4 lb. 2,4-DB controlled Chenopodium album at 0.5 lb. and at 1 lb. it controlled Silybum marianum, Cirsium vulgare, Rumex spp., Sisymbrium officinale, Fumaria officinalis and Urtica dioica, but not Polygonum aviculare or Chondrilla juncea. Poa annua, barley grass [Hordeum leporinum], and soft brome [Bromus mollis] were controlled by dalapon 1 lb.; prairie grass [B. catharticus] required 2-4 lb. - D.M.L.S. [O.W.]

241. * ROMBALDI, G.P. Cuscuta of lucerne and clover. Avvenire Agr., 1960, 68,(3),66-8,(It.)

242. * QUINN, L.R. and GRIFFING, J.B. [Control of "leiteiro" (Tabernaemontana affinis) and "amendoim" in pastures.] Coppercotia, 1959, 15,(120),31-4, (Portuguese).

243. INDIA, INDIAN FARMING. Silage from weed. Indian Frg, 1960, 10,(3),15.
It has been found at Dumaron, Bihar, that Cassia tora, though unpalatable to stock when growing, is readily eaten as silage. - D.M.L.S. [O.RE.]

244. ASHTON, F.M. (Dep.Agric.Bot.,Univ. California,Davis,U.S.A.) The major problem in vegetable crop production - weed control. Proc.12th Calif.Weed Conf., 1960, 72-4, tabs.1.

Costs for hand weeding in a number of truck crops are quoted, and compared with those for equivalent chemical weed control, the latter being 10%-25% cheaper. - P.C. [O.W.]

245. FRANK, R. (Western Ontario Agric. School.,Ridgetown,Canada). New herbicides for use in vegetable crops. Proc.7th ann. Meet.agric.Pest.Tech.Soc.[Canada], 1960, 83-4.

Herbicides discussed briefly are: CDAA, CDAA + trichlorobenzyl chloride, CDEC, EPTC, chlorpropham, chlorophenyl, methyl amides triazines, endothal,3,4-dichloropropionanilide, amiben. - P.J.B. [O.W.]

246. HALL, B.J. (Hawkesbury Agric.Coll., Richmond,N.S.W.,Australia). Experiences with three new herbicides (CDAA, CDEC, EPTC). Proc.2nd Aust.Weeds Conf., 1960, Pap. 59, pp.8, tabs.10.

In a time of spraying experiment in which CDAA 3 # was applied pre-em. to Prizetaker onions under ideal moisture conditions, early spraying (2 days after sowing) resulted in highest onion emergence, but lowest survival and highest weed numbers 2.5 months later. There was little difference in onion germination or weed counts from spraying 6, 10 or 14 days after sowing.

CDEC 6 # pre-em. has been used consistently in vegetables without injuring beetroot, tomatoes, cabbage, cauliflower, onions, lettuce, carrots, parsnips, cucumbers, pumpkin, squash, peas, beans, sweet corn or seedling asparagus. In silver beet, plant numbers and vigour were slightly reduced.

In pre-em. trials EPTC (incorporated) caused serious yield reductions in cucumbers and rock melons at 5 # and to gladiolus at 10 # (liquid and granular). Cabbage, peas, beetroot and sweet corn showed some tolerance to EPTC pre-em. In one trial EPTC caused a taint in beetroot. In post-em. trials 10 # (incorporated liquid or granular) caused no apparent injury to budded trifoliata orange stock, seedling peach stocks, grape vines or roses; bean yields were slightly reduced but there was no visible injury. - D.M.L.S. [O.W.]

247. HALL, B.J. (Hawkesbury Agric.Coll., Richmond,N.S.W.,Australia). Weed control in peas and beans. Proc.2nd Aust.Weeds Conf., 1960, Pap.23. pp.4.

Peas. Post-em. Dinoseb has given much the best post-em. results and is recommended at 1 # where broad-leaved weeds are the main problem. Other herbicides tested post-em. were MCPA 1 and 2 #, 2,4-DB 0.5-2 #, CDAA 1, 2 and 4 #, chlorpropham 1, 2 and 4 #, MCPB 0.5, 1, 2 and 4 # and CDEC 1, 2 and 4 #. MCPB has been ineffective under New South Wales conditions.

Pre-em. Of the following tested pre-em. CDAA 3 and 6 #, chlorpropham 3, 4 and 6 #, CDEC 3 and 6 # and EPTC 5 # (incorporated and non-incorporated) and CDEC at 6 # were best and consistently gave 95% grass control and 65-70% control of broad-leaved weeds. Only chlorpropham appeared to affect the peas adversely,causing stunting, late ripening, increased incidence of disease and reduced yields.

Beans. [Species not specified]. Dinoseb was most effective when applied immediately before emergence, but caused severe injury if applied when the beans had started to emerge. CDEC 6 # pre-em. gave excellent results and EPTC post-em. was reasonably satisfactory. - D.M.L.S. [O.W.]

248. GREAT BRITAIN, MINISTRY OF AGRICULTURE, FISHERIES AND FOOD. Broad bean weed control 1958. Rep.Efford exp.hort.Sta., 1959, 39.

Dinoseb amine 3 # applied 7 days after sowing broad beans [Vicia faba] as pre-em. treatment, and at 1 and 2 # when the beans were at the 1st leaf stage. Having regard to cost and risk of damage to crop, 1 # appeared the most satisfactory. - P.C. [O.W.]

249. ROBERTSON, J.A. (Div.Plant Industry, C.S.I.R.O.,P.O.Box 109,Canberra,Australia). Pre-emergence weed control in carrots. Proc.2nd Aust.Weeds Conf., 1960, Pap.46,pp.2.

Propazine 4 # applied immediately after sowing in 100 gal water to the carrot varieties Champion (Peerless), Topweight, Chantenay, and Early Shorthorn gave practically complete weed control for 14 weeks, increased yields, did not affect root shape, and caused no definite tainting. The main weeds in the control plots were sorrel [Rumex acetosella], milk-thistle [?Sonchus sp.], barnyard grass [Echinochloa crus-galli], phalaris [Phalaris tuberosa], rye [Secale cereale], Eragrostis sp., onion twitch [Arrhenatherum elatius, var.

bulbosum], skeleton weed [Chondrilla juncea], and wire weed [Polygonum aviculare]. - D.M.L.S. [O.W.]

250. HALL, B.J. (Hawkesbury Agric.Coll., Richmond,N.S.W.,Australia). Weed control in beetroot and silver beet. Proc.2nd Aust.Weeds Conf., 1960, Pap. 20, pp.6.

(a) Beetroot. With post-em. applications at the 2- and 4-leaf stage, MCPB [rate not given] killed the beetroot; sodium chloride/sodium nitrate mixture (200 # of each) killed or severely injured the beet at the 2-leaf stage, but caused only slight injury at the 4-leaf stage and gave total control of broad-leaved weeds and partial control of grasses. Dalapon 4-8 # caused some leaf curl or burn, which was severe from 8 # applied at the 4-leaf stage. Post-em. applications were later abandoned because control with pre-em. treatments was so completely satisfactory. Of several herbicides tested pre-em., CDEC 6 # was the most effective and is now in commercial use. EPTC and DCU caused off-flavours. In one trial yields of Topmarket variety were unaffected by CDEC 6 and 9 # and by TCA 9 #, whereas yields of Improved Detroit were reduced by CDEC 9 # and by TCA 9 and 12 #. Coronopus didymus was completely resistant to an endothal + TCA mixture [rate not stated].

(b) Silver beet. In one [?pre-em.] trial CDEC 6 # reduced crop vigour and numbers; endothal 9 # + TCA 9 # caused no injury but gave poor control of grasses. - D.M.L.S. [O.W.]

251. FISCHER, A. (Landw.Versuchungsstation Limburgerhof der BASF Germany). Neue Herbizide zur Unkrautbekämpfung in Rüben- und Gemüse-kulturen in Vorauflanfverfahren. [New pre-emergence herbicides for weed control in beet and vegetables.] Z.Pfl.-Krankh., 1960, 66,(10), 577-88, (G.e.), figs.9,tabs.2,bibl.15.

Cyclo-octyl-dimethyl urea (OMU) applied pre-em. gave selective weed control in carrots, onions, peas, beet, beans, spinach and forest nurseries. It showed shorter persistence in the soil than monuron. Weed species controlled well by applications of 0.4-1 kg/ha a.i. were Chenopodium album, Atriplex hastata, Stellaria media, Urtica urens, Capsella bursa-pastoris, and Galinsoga parviflora. With butinol-N-(3-chlorophenyl) carbamate [BiPC] mixed in a ratio of OMU 3 parts:BiPC 2 parts, selectivity was maintained, and additional species controlled were Fumaria officinalis, Lamium spp. and Avena fatua. - P.C. [O.R.]

252. HALL, B.J. (Hawkesbury Agric.Coll., Richmond,N.S.W.,Australia). Weed control in onions. Proc.2nd Aust.Weeds Conf., 1960 Pap. 19, pp.8.

Under New South Wales conditions, CDAA has been much the best pre-em. herbicide so far tested, except with later sowings in cooler conditions, in which chlorpropham has been the most effective. For post-em. control chlorpropham has given the best results and monuron and EPTC have been promising. The following have been tested and rejected: pre-em. - sodium ethyl xanthate, neburon, dalapon, 2,4-DB, 2,4,5-TB, EPTC; post-em. - 2,4-DB, MCPB, 2,4,5-TB, dalapon, neburon, DCU, CDAA and mixtures of CDAA or chlorpropham and 2,4-DB or MCPB. Onions showed only a narrow range of tolerance to monuron pre-em. Burr medic [Medicago sp.], stachys [Stachys arvensis], Lamium sp., Galinsoga [parviflora] and Amaranthus sp. have proved resistant to chlorpropham. - D.M.L.S. [O.W.]

253. KEFFORD, R.O. (Hort.Div.,Dep.Agric., Treasury Gardens,Melbourne,Australia). Selective chemical weed control in onions - Victorian trials. Proc.2nd Aust.Weeds Conf., 1960, Pap. 24, pp.5, bibl.2.

Chlorpropham has been recommended to growers for pre-em. use. Monuron has also given good results but has been slightly less effective and slightly more injurious over a wide range of conditions. Weed control with CDAA and CDEC has been a little less efficient. When using chlorpropham pre-em., seed should be sown at exactly 1 in. deep; deeper sowing has caused injury, possibly because onions were approaching the sensitive "flag" stage when they came into contact with the herbicide. Rates recommended to growers are: 4 # on heavy black volcanic soils (6 # has a longer residual effect and appears to be best at Glenormiston), 3 # on lighter volcanic soils and peaty soils, and 2 # on sandy loams. These rates normally control weeds for 8 weeks; germination of Poa annua, Stellaria media, Cerastium glomeratum, Polygonum aviculare, and Cryptostemma calendulaceum is inhibited and P. annua and S. media seedlings are killed. Lamium amplexicaule, thistles [Cirsium spp.] and Chenopodium album are resistant and clovers [Trifolium spp.] only partially controlled. To post-em. applications of chlorpropham onions are resistant in the hook stage, sensitive in the flag stage and resistant from the 2-leaf stage onward. Post-em. rates are usually 1 # higher than the recommended pre-em. rates and will normally control Solanum nigrum and newly germinated winter weeds. Potassium cyanate 15-20 # is applied in the early summer to control surviving weeds. On sandy market-garden soils,

chlorpropham is unsuitable for seedbeds as damage has been caused even by 1 #, but 2 # applied post-em. to transplanted seedlings caused no injury. Diuron 1.5-2 # has been ghe most effective chemical for controlling L. amplexicaule in both the germinating and the seedling stage; neburon post-em. was less effective and Randox [CDAA] 6 # ineffective. When diuron was applied at 2 # post-em. after 2 # pre-em., yellowing of onion leaf tips developed, but onions recovered completely. - D.M.L.S. [O.W.]

254. HALL, B.J. (Hawkesbury Agric.Coll., Richmond,N.S.W.,Australia). Weed control in cucumbers, pumpkins and rockmelons. Proc.2nd Aust.Weeds Conf., 1960, Pap.22, pp.7.
Cucumbers. In pre-em. trials during 2 years, CDEC and amitrole gave excellent results and increased yields and are recommended each at 6 #. Although there is little difference in effectiveness between them, CDEC has shown better residual effects, better grass control, and is less affected by weather conditions. If no rain occurs after spraying and the surface soil tends to dry out, light irrigation is advised. Slight increases in yield were also obtained with Alanap [NPA] 4 and 12 #; 12 # gave the best weed control, but caused slight stunting, delayed maturity and slightly reduced average fruit quality and weight. CDAA 3 and 4 # caused no adverse effects and yields were slightly above controls, but results were inconclusive, mainly owing to dry weather. Monuron 0.75, DCU 10 and 20 and EPTC 5 # (incorporated) and 8 # were all injurious.
Rockmelons. CDEC and amitrole appeared to be non-injurious.
Pumpkins. Pre-em. herbicide applications have caused definite increases in yield and quality. Butternut pumpkins appeared to be unaffected by EPTC 8 # pre-em. - D.M.L.S. [O.W.]

255. HALL, B.J. (Hawkesbury Agric.,Coll., Richmond,N.S.W.,Australia). Varietal responses with herbicides. Proc.2nd Aust. Weeds Conf., 1960, Pap. 26, pp.4.
Examples are given of varietal differences in response to herbicides in peas, gladiolus, onions, beetroot and cucumbers. Factors to consider in breeding for herbicidal resistance are listed. The following general indications were observed in a trial in which MCPB 1, 2 and 3 # was applied to 9 pea varieties; (1) the earlier the variety the greater the yield reduction with late spraying; (2) the less waxy the leaf, the greater the susceptibility to increased concentrations of MCPB; (3) the less waxy the leaf. the bigger the yield differential between early and late spraying; (4) late sprayings delayed maturation. - D.M.L.S. [O.W.]

256. TOWLER, M.J. Weed control with residuals. Comm.Gr., 1961, (3306), 241.
Notes the successful commercial use in Bedfordshire of the following residual pre-em. herbicides: Herbon Pink [composition not stated] on Cobham Green lettuce; Herbon Red [chlorpropham + fenuron] on peas and parsley and on Wedgwood iris. The iris crop was sprayed in September and had received five successive annual applications. - H.A. Roberts. [NVRS]

257. HALL, B.J. (Hawkesbury Agric.Coll., Richmond,N.S.W.,Australia). Weed control in gladiolus. Proc.2nd Aust.Weeds Conf., 1960, Pap.21, pp.7, tabs.3.
In pre-em. trials 2,4-D at 2 # (in mixtures with TCA) caused distortion to many varieties and EPTC at 5 and 10 # granular and 10 # spray was highly injurious. None of the following caused injury: 2,4-DES 2-6 #, chlorpropham 3-6 #, dinoseb 4 and 8 #, CDAA 4 and 6 #, neburon 2 and 4 #, simazine 1 and 2 #, monuron 0.5-2 #, amitrole 4 and 8 # and TCA 10 #. Good weed control was obtained with chlorpropham 6 #, monuron 2 # (and higher rates) and TCA 10 # (grasses). Results with simazine and monuron were inconclusive owing to dry conditions; the effects of CDAA and dinoseb did not persist; 2,4-DES was erratic in its effect, and amitrole unsatisfactory. Monuron 3 # is recommended, but shallow planting must be avoided. In the dinoseb plots no signs of nematodes could be found, whereas in adjoining plots infestation in the form of root nodules was apparent. - D.M.L.S. [O.W.]

258. * YOUNGNER, V.B. The control of Poa annua, annual bluegrass in putting greens. Sth.Calif.Turfgrass Cult., 1958,9,(4),27-9.

259. FERGUSON, M.H. Poa annua control. U.S. Golf Ass.J. & Turf Mgmt, 1959, 12, (5), 25-8.
Management practices which favour the development of Agrostis spp. in turf and discourage that of Poa annua are: good drainage; top dressing with NPK in the ratio 3:1:2 so that the level of soil P is kept relatively low; relatively infrequent irrigation so that the top 2 in. of soil remains dry for as long as possible;

removal of dead plant material from the surface; dressing with lead arsenate; the use of vigorous Agrostis varieties. - Herb.Abstr., 30,(3),1172.

260. McHENRY, W.B. (Univ.California, Berkeley,U.S.A.) Pavement weed control - what do we know about it? Proc.12th ann. Calif.Weed Conf., 1960, 55-7.
Pre-pavement weed control includes: deep excavation, consolidation of subcourse and application to it of herbicides. Monuron, diuron, simazine, borates and arsenic have been used as soil-sterilants. Post-pavement weed control includes the application of a herbicide to the pavement edge or shoulder, to joints and cracks, and into the subcourse by injection through the surface pavement. Dalapon, amitrole and 2,4-D are very effective. - P.C. [O.W.]

261. EVENS, G.W. (A.R.C.Weed Res.Org., Begbroke,Oxford,England). The use of herbicides on strawberries. Grower, 1961, 55,(6),276,279.
Reviews briefly the use of dinoseb, 2,4-DES, chlorpropham, fenuron and simazine. - P.J.B. [O.W.]

262. UNITED STATES, MASSACHUSETTS AGRICULTURAL EXPERIMENT STATION. 1960 Cranberry weed control chart. Mass.agric.Exp.Sta. Ext.Serv., 1960, Chart. [24(74.4)]

263. DANA, M.N. (Univ.Wisconsin,Madison 6, U.S.A.) Simazine for annual weed control in cranberries. Weeds, 1960, 8,(4),609-11, tabs.2,bibl.4.
Granular simazine was tested during 2 years for the control of annual weeds in cranberries. Doses of 8 # resulted in severe foliage damage, with up to 40% reduction in crop yield. A rate of 4 # produced foliage injury ranging from slight to severe, the degree being correlated with soil texture; 1 and 2 # caused no injury. Control of Ambrosia artemisiifolia, Bidens connata, Panicum spp. and Polygonum pennsylvanicum was excellent at all rates of simazine and 1 and 2 # used on very weedy plots resulted in increased crop yield. - P.C. [O.W.]

264. LARSEN, R.P. and RIES, S.K. (Michigan State Univ.,East Lansing,U.S.A.) Simazine for controlling weeds in fruit tree and grape plantings. Weeds, 1960, 8,(4),671-7, tabs.6,bibl.9. [O.W.]

265. AITCHLIFF, A.J. (Commonwealth Res.Sta., Merbein,Victoria,Australia). Chemical control of weeds under vines. Proc.2nd Aust.Weeds Conf., 1960, Pap. 17, pp.2, tabs.1.
In a field of currants [grapes] where the main weeds were Setaria verticillata, Lactuca serriola, Chenopodium album and Xanthium spinosum and the herbicides were applied shortly after bud-burst, monuron and diuron both at 1.25 # gave excellent weed control, whereas polyborchlorate [boron trioxide 49% + sodium chlorate 25%] and a spray containing "Pentapine" [PCP sodium 63%] 2 fluid oz and "Creomuls" [creosote 60%, mineral oil 18%] 2.4 fluid oz/gal were so ineffective that the weeds interfered with picking. Yields where the 2 urea herbicides were used were increased, but not significantly. - D.M.L.S. [O.W.]

266. JORDAN, L. (Univ.California,Riverside, U.S.A.) The effects of monuron on lemon fruit quality. Proc.12th Calif.Weed Conf., 1960, 80-1, tabs.1.
In long term trials in which monuron at 3 # of an 80% formulation was used, no significant change was observed in fruit shape, juice or acid content after 5 consecutive years of treatment. - P.C. [O.W.]

267. CANNON, R.C. (Hort.Branch.Dep.Agric., William St.,Brisbane,Australia). Recent developments in weed control in pineapples. Proc.2nd Aust.Weeds Conf., 1960, Pap.16, pp.3.
Experimental work with PCP (pre-em.) and + diesel oil or creosote (as contact spray), monuron, diuron, simazine, atrazine, TCA, dalapon, CDEA and CDEC is very briefly reviewed. For PCP pre-em., a volume rate of at least 200 gal/ac has been found necessary. Contact sprays based on PCP give only temporary control of grasses and are therefore not a satisfactory alternative to pre-em. sprays. Monuron appears to give better grass control than PCP and at 8 # has produced no symptoms of injury in pineapples. Diuron promises to be equal or superior to monuron. Atrazine also appears very promising and superior to simazine and at 2 # has caused no injury. Both TCA and dalapon caused injury even at 1 #. Neither CDAA nor CDEC gave better control of grass than PCP and caused considerable skin irritation. - D.M.L.S. [O.W.]

268. INDIA, INDIAN INSTITUTE OF SUGARCANE RESEARCH, LUCKNOW. Rep.Ind.Inst.Sugarcane Res.,Lucknow 1958, 1959, pp.90.
Agricultural engineering. Flaming gave effective control of weeds when 1-2 in. high,

but effect on Cyperus rotundus was only temporary. -- From Hort.Abstr., 30,6203. - D.M.L.S.

269. MEDLEY, V.F. Preventive weed control in tea. World Crops, 1961, 13,(3),103-5, figs.3,tabs.1.
Weed control problems in Thea sinensis in Ceylon are briefly discussed. Experiences with simazine indicated that effective weed control where 2 lb simazine 50% wettable powder/ac was maintained until 10-20 in. rain had fallen and where 4 # was applied, until 15-40 in. rain had fallen. For continuous control of weeds involving repeated applications of 2 or 4 lb 50% simazine wettable powder/ac, it was estimated that 8-12 # would be required during the first year in upland areas and 12-20 # in lowland areas. T. sinensis has shown marked tolerance to simazine and rates up to 80 # applied to the soil surface have not injured established plants. Young plants have been shown to tolerate rates of 2 # at 2 months after planting. Strachytarrheta jamakensis, Cardamine tricocarpa and Drymaria cordata have not been effectively controlled by rates of 2 lb 50% wettable powder/ac, but have been killed by higher rates. Species with aerial stem systems and which root at the nodes, such as Polygonum nepalense and Commelina spp. are susceptible to simazine at the seedling stage, but stem fragments left on the soil surface have been able to take root in soils treated with low rates of this herbicide. Other species resistant to low doses of simazine have included Panicum repens, Imperata cylindrica, Cyperus rotundus, Gleichenia sp., Oxalis corniculata, O. corymbosa and O. latifolia. - P.J.B. [O.W.]

270. JOHNS, H.R. (Asplundh Tree Expert Co., Jenkentown,Penn.,U.S.A.) Tree growth retardants. Proc.Nat.Shade Tree Conf., 1959, 35,130-43.
The problems and advantages of using the following methods of chemical tree inhibition are discussed: foliage application, band application, injection, soil application and application to pruning cuts. Mechanical tree inhibition by means of root pruning, girdling of bark, tying a knot in the stem, and bark inversion, are also mentioned briefly. - J.W.F. [O.F.]

271. TAUCHNITZ, E. (Oranienburg,East Germany). Chemische Unkrautbekämpfung auf Nadelholzkulturen. [Chemical weed control in conifers.] Forst und Jagd, 1960, 10, (5), 231-3. [43(268)]

272. * van DEUSEN, J.L. Effect of controlling competition on the establishment of young conifers in plantations. For.Thesis, Iowa State Coll., 1957.

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See also 325,328.

273. MARTIN, P. and RADEMACHER, B. (Inst. Pflanzensch., Stuttgart-Hohenheim,West Germany). Studies on the mutual influences of weeds and crops. Biology of Weeds, Symp.Brit.Ecol.Soc., 1960, 143-52, figs.4, tabs.7,bibl.13.
Four litre culture pots were connected by glass pipes and 2 plant species put in alternate pots. Richter's nutrient solution was supplied and circulated through the pots. Scopoletin liberated from the root cells of oats had an inhibiting effect on Sinapis arvensis and Papaver rhoeas, but not on Matricaria maritima, which was more affected by rye than by wheat root-exudates. - P.C. [265(43)]

274. HANF, M. (Landw.Versuchstation Limburgerhof,BASF,Ludwigshafen,Rhein, Germany). Unkräuter des Rübenackers. [Weeds of beet fields.] Prakt.Bl.Pflanzenb.und Pflanzensch., 1959, 54,(5), 162-74, (G.), figs.2,tabs.5,bibl.6.
Studies of weed flora were made during the course of trials on the use of OMU + BiPC (cyclo-octyl dimethyl urea + butinol chlorophenyl carbamate) in sugar beet, and species were listed in order of frequency on various soil tupes, ranging from sand to heavy loam. - P.C. [262(43)]

275. RAMBO, B. Die europoische Unkrauter in Südbrasilien. [European weeds in south Brazil.] Sellowia, 1960, 12,(12),45-78, (G.e.), bibl.3.
Information is given on the European weeds in Rio Grande do Sul; of the 95 species present less than 10% are noxious. - From Herb.Abstr., 30,(4)

276. OHMAN, J.H. and KOMEDAHL, T. (Dep.Plant Path.& Bot.,Univ.Minnesota, St.Paul,U.S.A.) Relative toxicity of extracts from vegetative organs of quackgrass to alfalfa. Weeds, 1960, 8,(4), 666-70, tabs.3,bibl.4.
The effects of hot water extracts of the

roots, stems, rhizomes and leaves of Agropyron repens on germinating alfalfa seeds were studied. The germination of lucerne was reduced 5-15% by extracts of roots, stems and rhizomes, while leaf extracts reduced germination by 30-50%. The length of seedlings was also reduced much more by leaf than by root, stem or rhizome extract. Extracts from soil on which A. repens had been growing checked seedling growth more severely than extracts from soil where Cirsium arvense had been growing. - P.C. [O.W.]

277. GRUMMER, G. and BEYER, H. (Greifswald, Germany). The influence exerted by species of Camelina on flax by means of toxic substances. Biology of Weeds, Symp. Brit.ecol.Soc., 1960, 153-7, tabs.5, bibl.4.
Experiments are described which strongly support the theory that toxic substances are washed out of Camelina leaves by rain and that these substances play a role in the interaction between Camelina sp. and flax. Attempts to isolate the kolines show that at least 4, but more probably 6, substances of phenolic configuration are contained in Camelina and are toxic to flax. So far p-hydroxybenzoic acid and vanillic acid have been identified. It seems likely that ferulic acid and another unidentified toxic substance are also present. It was shown that the 4 toxic substances can easily be washed out of normal green leaves in reasonable quantities by a short period of rain. The form of rain plays an important role in determining the quantity of toxin liberated. - D.M.L.S. [O.W.]

278. CORDS, H.P. (Nevada Agric.Exp.Sta., Reno, U.S.A.) Factors affecting the competitive ability of foxtail barley (Hordeum jubatum). Weeds, 1960, 8, (4), 636-44, figs.5, tabs.4, bibl.3.
Seeds of foxtail barley were stored in (a) water, (b) dry sand and (c) in water-saturated sand at either 10°F or 35°F. Samples were removed after 1, 2 and 4 weeks and grown at 20°C in light and the seedlings grown in tanks, 2 of them containing saline-alkaline solution (E.C. 10 mmho/cm², and pH 8.0), with the water table held at depths of 2, 4, 6 and 18 in. The plants were harvested immediately after flowering. This degree of salinity coupled with low water table reduced growth in all experiments. In the second year of experiments, foxtail barley showed greater growth on saline soil.
Festuca spp. grew best on non-saline soils at all levels of water table and responded as well to nitrogenous fertilisers as did foxtail barley, suggesting that as it can be crowded out by vigorous perennial grasses, the use of salt-tolerant competitors such as tall wheatgrass [Agropyron sp.] may control foxtail barley under conditions of high soil fertility. - P.C. [O.W.]

279. * MODIN, G.V. On the dispersal of the seeds of some weed plants by the hare Lepus europaeus. Zool.Zhur., 1960, 39, (3), 472-4.

280. HITCHINGS, S. (Off.Seed Test.Sta., Cambridge, England). The control and eradication of weeds in seed crops. Biology of Weeds, Symp.Brit.ecol.Soc., 1960, 108-15 tabs.1, bibl.5.
As part of a record in an unfinished trial of a herbage seed crop grown in a weedy field, some observations are noted concerning the survival and germination of weed seeds and the seed production of Rumex crispus and Agropyron repens. - D.M.L.S. [O.W.]

281. PRITCHARD, T. (Nature Conservancy, London, England). Race formation in weedy species with special reference to Euphorbia cyparissias L. and Hypericum perforatum L. Biology of Weeds, Symp.Brit.ecol.Soc., 1960, 61-6, bibl.3.
Includes discussion of (1) the distribution and performance of diploid and tetraploid forms of E. cyparissias, and (2) race formation in H. perforatum. - D.M.L.S. [O.W.]

282. STYLES, B.T. (Dep.Bot., Univ.Oxford, England). The taxonomy of the British knotgrasses. Biology of Weeds, Symp.Brit.ecol. Soc., 1960, 48-54, figs.5, tabs.1, bibl.7.
Investigations have shown that of the 5 Taxa given in Clapham, Tutin and Warburg (Flora of the British Isles, 1952) viz. Polygonum aviculare L = heterophyllum Lindm., P. aequale, P. rurivagum, P. littorale and P. calcatum, only the first 3 have any reality in nature and are distinguishable on morphological and cytogenetic grounds. - D.M.L.S. [O.W.]

283. BRADSHAW, A.D. (Dep.Agric.Bot., Univ.Coll. N.Wales, Bangor, Caerns., Wales). Population differentiation in Agrostis tenuis Sibth. New Phytol., 1960, 59, (1), 92-103, figs.2, tabs.5, bibl.15.
Investigations into physiological differences in A. tenuis populations originating from

contrasting habitats are described. The behaviour of each population could always be related to its original environment and the physiological differentiation was not necessarily accompanied by morphological differentiation. It was concluded that the pattern of physiological differentiation was a graded patchwork pattern similar to the pattern of morphological differentiation. - D.M.L.S. [O.R.]

284. BRADSHAW, A.D. (Dep.Agric.Bot., Univ. Coll.N.Wales Bangor, Caerns., Wales). Population differentiation in Agrostis tenuis Sibth. I. Morphological differentiation. New Phytol., 1959, 58, 208-27, figs.3, tabs.3, bibl.32.
The main conclusions drawn from investigations of 60 tillers collected from each of 33 areas mainly in central Wales were: (1) that the environment is the dominating factor in determining population differentiation and since the environment is a graded patchwork of different conditions, the pattern of differentiation is similar; (2) although the distribution is continuous, distances of about 50 miles or less are sufficient to isolate populations effectively from one another; (3) the species is thus able to evolve under the influence of natural selection in response to very local variations in environment. - From Author's summary. - D.M.L.S. [O.R.]

285. CHADWICK, M.J. (Dep.Agric.Bot., Univ. Coll.N.Wales, Bangor, Caerns., Wales). Nardus stricta, a weed of hill grazings. Biology of Weeds, Symp.Brit.ecol.Soc., 1960, 246-56, figs.5, tabs.3, bibl.13.
About a quarter of the hill grazings of Wales, England and Scotland contain, in varying abundance, N. stricta which is of low productivity and palatibility. The distribution and its relationship to environment is examined. Qualitative differences in vegetative growth are related to past land use of grazings, and it is shown that Nardus has been able to spread and invade hill grazings when factors arresting its expansion are removed by changing social and economic conditions (e.g. the general removal of wethers from the hills). - D.M.L.S. [O.W.]

286. LIETH, H. (Bot.Inst., Landw.Hochschule, Stuttgart-Hohenheim, Germany). Patterns of change within grassland communities. Biology of Weeds, Symp.Brit.ecol.Soc., 1960, 27-39, figs.6, bibl.10.
The paper is concerned with (1) the establishment of newly-invading species, (2) the movement of different species during several years, and (3) the development of individual clones. - D.M.L.S. [O.W.]

287. GORMAN, M.J. and DUNICAN, L.K. (Dep.Agric.Bot., Univ.Coll., Dublin, Eire). The biology, ecology and control of the bulbous buttercup. M.Agr.Sci.Thesis, Nat.Univ.Ireland, (n.d.), pp.37, figs.4, tabs.11, bibl.13.
The studies in Ranunculus bulbosus described covered: (1) life history; (2) factors responsible for its aggressiveness in pastures, i.e. perennial habit of growth, heavy achene production, and poisonous nature; (3) ecology and population in (a) well-managed pastures, (b) dairy pastures, (c) calf paddocks and (d) poorly-drained pastures. R. bulbosus was found in all pastures studied except those waterlogged. Actual populations depended primarily on pasture management, being greatest in dairy pastures and least in carefully managed fields, and was correlated with water table levels the highest populations being found in dry pastures. No correlation with soil fertility or with the botanical composition of the sward was evident.
In greenhouse trials MCPA (potassium) 1.56 % and 2,4-D (triethanolamine) 1.25 in 100 gal water were applied (1) in winter when the old corms were almost exhausted and the new corms showed signs of swelling, (2) in spring when the old corms were entirely exhausted and the new corms one-third of their eventual size, (3) at the early bud stage, and (4) at the late stage. At these rates MCPA was superior to 2,4-D at all stages. The most susceptible stage of growth was the early bud, at which stage MCPA gave 85% control (acrial parts and corms). The importance of high volume spray is emphasized. The study indicated that best control would be obtained by application of MCPA during early flowering, combined with improved pasture management. - D.M.L.S. [DE]

288. * PRITCHARD, T.O. The genecology of weed species. Studies on Euphorbia cyparissias L. and Hypericum perforatum L. Ph.D.Thesis, Univ.Leeds.

289. ROBINSON, E.L. (N.Carolina Agric. Exp.Sta., Whiteville, U.S.A.) Growth of witchweed (Striga asiatica) as affected by

soil types and soil and air temperatures. Weeds, 1960, 8,(4),576-81.

In 1957 and '58, Striga asiatica seed was sown in 12 different soil types, ranging from coarse sand to heavy clay, in boxes held in the open at Whiteville, N.Carolina. Maize was used as a host plant. S. asiatica germinated and grew well on all soil types except Kaufman clay in 1957 and on all soil types including Kaufman clay in 1958. The average soil temperature at a depth of 3 in. at Whiteville was 70°F or more for approximately 180 days, which was similar to the conditions prevailing at Potchefstroom, S. Africa, where S. asiatica grows indigenously. Rainfall at Potchefstroom is normally about half that at Whiteville, suggesting that temperature is more important than rainfall in determining the areas in which S. asiatica will grow well. At Lincoln, Nebraska, the duration of temperatures of 70°F or more at a soil depth of 3 in. was approximately 120 days and it was concluded that temperature alone did not appear to offer a permanent barrier to the survival of S. asiatica as far north as this. - P.J.B. [O.W.]

290. MANN, L.K. (Dep.Veg.Crops, Univ. California, Davis, U.S.A.) Bulb organization in Allium: some species of the section Molium. Amer.J.Bot., 1960, 47,(9),765-71, figs.6, bibl.10. [O.W.]

291. WILSE, A.F. (Texas Agric.Exp.Sta., Southwestern Great Plains Field Station., Bushland, Texas, U.S.A.) Effect of tansy mustard (Descurainia intermedia) on moisture storage during fallow. Weeds, 1960, 8,(4), 603-5, figs.1, bibl.8.

A study was carried out to compare moisture losses from soil carrying a heavy infestation of D. intermedia with moisture losses from stubble or mulched fallow. Moisture losses were determined gravimetrically in 1958 during mid-January to June. The total evapo-transpiration from the D. intermedia plot was 10.46 in. and from the weed free plot 6.46 in. D. intermedia which emerged in October did not use more soil moisture than was evaporated from bare soil, until after mid-March. This study indicated that small weeds are not always detrimental to soil moisture storage during a fallow period, and that further work should be carried out to determine the inter-relationship between the various factors governing soil moisture storage. - P.C. [O.W.]

292. EDWARDS, R.W. and OWENS, M. (Water Res.Pollution Lab., Stevenage, Herts., England). The effects of plants on river conditions. I. Summer crops and estimates of net productivity of macrophytes in a chalk stream. J.Ecol., 1960, 48,151-60, figs.4, tabs.5, bibl.19.

Methods of estimating the fresh-weight of aquatic macrophytes were investigated. Spin-drying resulted in less variation than air-drying and was also superior in speed and ease of operation.

Between June and September 1958, crops from a chalk stream increased from 160 to 520 g of dry weight/m^2. This represents a net primary productivity of 1.44 g organic carbon/m^2/day. The efficiency of utilization of solar energy was 0.42%.

The average increase in dissolved oxygen concentration brought about by plant growth was equivalent to about 1.65 p.p.m./mile, calculated on a daily basis. - From Authors' summary. - J.W.F. [440(42)]

293. HORTOBAGYI, T. (Univ.Agrarwissenschaften, Gödöllö, Hungary). Das mehrmonatige Leben von Algen eines austrocknenden Teichbettes unter erschwerten bedingungen (im Laboratorium). [Survival under laboratory conditions of algae collected from the bottom of a desiccated lake.] Hung.acta biol., 1960, 10,299-330.

A detailed description is given of the life, multiplication, cellular and coenobic changes of Scenedesmus soli. Ecological and taxonomic observations are included. - From Author's summary. - D.M.L.S. [O.R.]

294. * NORDVINKINA, A.I. The fatuoides. Selek. i Semen., 1960, (2),61-2.

With reference to oat seeds.

295. HILL, K.R. The world-wide distribution of senecioisis in man and animals. Proc.Roy. Soc.Med., 1960, 53,201-3.

(As a result of ingestion of plants of the genera Senecio, Crotalaria and Heliotropium). The condition is described. - From Vet.Bull., Weybridge, 30,(9),526. - D.M.L.S.

296. LINDT, S. Über eine Schachtelhalmvergiftung bei Kälbern. [Equisetum poisoning in calves.] Schweiz.Arch.Tierheilk., 1959, 101,461-4,(G.e.f.it.)

An outbreak of E. palustre poisoning in calves after 2 weeks' drought is described. The animals recovered after treatment with B. vitamins and stimulants. - From Vet.Bull., Weybridge, 30,(5),269. - D.M.L.S.

297. BERRY, G.J. Research and developments in aquatic weed control. Proc. 12th ann. Calif. Weed Conf., 1960, 75-8.
Amitrole or dalapon at 5-10 lb/100 gal water at 400 gal/ac, applied July-September, control Typha spp.; dalapon + amitrole or 2,4-D may also be used successfully. Granular forms show promise.
Biological control has also been investigated; certain herbivorous fish, notably the Israeli carp, eliminate all rooted vegetation when stocked at 50 fish/ac. - P.C.
[O.W.]

298. HERRON, J.W. Control of cattails in ponds. Leafl. Ky Univ. Agric. Ext. Serv., 1960 229, pp.4.
Typha spp. Recommends dalapon (85%) 4 oz/gal water or amitrole 2 oz/gal water for small areas and dalapon 20-25 lb/100 gal water or amitrole 5-7 lb/100 gal water for large areas. Dalapon is most effective when applied to plants ca. 2-3 ft above the surface of the water and amitrole just before or at flowering or heading. - D.M.L.S.
[16(76.9)]

299. HOLZ, W. and RIETH, G. Chemische mittel zur Grabenentkrautung. [Chemicals for removing weeds from ditches.] Wasser u. Boden, 1961, 13,(1),15-18.
Reviews herbicides and methods of applying them. - Landb. Documentatie, 1961, 17,(8), 1044.

300. BLONDEAU, R. (Shell Development Co., U.S.A.) Aqualin herbicide - a new weed killer for submersed aquatic vegetation. Proc. 12th ann. Calif. Weed Conf., 1960, 9-12.
Aqualin is a clear volatile formulation of acrolein. It is much more active at temperatures above 60°F, 1 p.p.m. at 70°F for 2.5 hours being sufficient to kill leaves of Elodea sp. There has been no crop injury through using concentrations of up to 30 p.p.m. in irrigation water. Recommended range of dosage is 0.5-3 gal/ac ft, which is toxic to fish though not to livestock. - P.C.
[O.W.]

301. CARVELL, K.L. and BERTHY, H.P. A guide to killing woody plants in West Virginia. Circ. W. Virginia agric. Exp. Sta., 1959, 107, pp.9, tabs.3.
Chemicals for killing woody plants and methods and equipment for applying them are briefly reviewed. - P.J.B. [9(75.4)]

302. * JONES, H.B. Progress in the chemical control of certain weed trees, shrubs and grasses on forest lands of western Oregon. For. Thesis, Oregon State Coll., 1958.

303. LEONARD, O.A. and CARLSON, C.E. (Univ. Calif., Davis, U.S.A.) Kill of blue oak [Quercus douglasii] and poison oak [Rhus diversiloba] by aircraft spraying with phenoxy herbicides. Weeds, 1960, 8,(4),625-30, tabs.2, bibl.11.
See Weed Abstracts, 9, 121. [O.W.]

304. JOHNSTON, A.N. and RUSSELL, K.W. (Agric. Ser. Pty Ltd., 28 Bungaree Road, Pendle Hill, N.S.W., Australia). Studies in susceptibility of certain Eucalyptus and Angophora species to herbicides. Proc. 2nd Aust. Weeds Conf., 1960, Pap.55, pp.12 tabs.7.
The results are given of preliminary trials in which 2,4,5-T (acid, butoxyethanol ester and triethanolamine salt) and 1:1 and 1:2 mixtures of 2,4,5-T and 2,4-D butoxy ethanol esters were applied to Eucalyptus Wilkinsoniana, E. siderophloia, E. punctata and Angophora Bakeri. in diesel distillate (except the amine which was applied in water) at 2.5% to frills and at 2.5 and 5% (at 1 fluid oz/in. diameter) to stumps and were compared with diesel distillate alone. E. siderophloia was resistant to all treatments applied to frills. A 100% kill of A. Bakeri was secured after 85 weeks following all treatments except those with amine and the diesel distillate. All stump treatments gave 100% control of E. Wilkinsoniana except those with diesel distillate, and the 5% concentrations gave 87.5-100% control of E. siderophloia. Comparisons of the different formulations showed no clearly defined results. It was considered that frill treatment is not reliable and that stump treatment would satisfactorily prevent coppice regeneration.
Foliage sprays with the same compounds and mixtures at 0.25-1% gave 100% control of E. umbra, E. tereticornis and A. costata 2-year old regrowth. - D.M.L.S.
[O.W.]

305. ROBERTSON, J.A. (C.S.I.R.O., P.O. Box 109 City, Canberra, Australia). Chemical control of Eucalyptus regrowth. Proc. 2nd

Aust.Weeds Conf., 1960, Pap.54, pp.7, tabs.3, bibl.2.

2,4,5-T (butoxyethanol ester) 5 # in 100 gal water applied in autumn to Eucalyptus rossii regrowth 1.5-2 ft high gave virtually complete control and was slightly more effective than mixed 2,4,5-T and 2 4-D esters at 5 # and markedly more effective than either 2,4,5 T or the mixture at 2.5 #. AMS 12.5-100 # was effective at rates of at least 25 # when applied with a wetting agent, but not without. Winter applications of all 3 compounds were ineffective. - D.M.L.S. [O.W.]

306. HENRY, N.B. (Dep.For.,108 George St., Brisbane,Australia.) Aerial application of herbicides for control of Eucalyptus and Acacia spp. in exotic pine plantation establishment. Proc.2nd Aust.Weeds Conf., 1960, Pap. 53, pp.19, bibl.1.

1. Ground spraying. Virtually complete control of seedling Acacia spp. (mainly A.cunninghamii with A. complanata and A. aulacocarpa also present) can be obtained with 2,4,5-T ester 0.5% in water. For greatest economy application should be made on completion of germination, which is usually 2 or 3 months after burning when most of the seedlings are 6-9 in. high.

The cost is comparable with 1 handcutting and the treatment normally eliminated the need for further cutting. Coppice of Eucalyptus spp. (mainly E. micrantha with E. intermedia, E. gummifera and E. trachyphloia also present) can be controlled by 2,4,5-T ester 1% in water, the optimum time for application being in autumn, 5 months after a spring burn, when the coppice is 2-3 ft high. The treatment eliminates the need for the first hand cutting and reduces the cost of subsequent cuttings. Persistent coppice can be controlled by treating the cut stumps with 2,4,5-T amine which has been found more effective than the ester; E. microcorys, E. resinifera and E. drepanophylla are also controlled by this treatment, but are normally resistant to the foliage spraying with 2,4,5-T ester 1%. Tristania conferta and T. suaveolens are resistant to both treatments.

2. Aerial application. Experiments during 3 years are described and the economics of aerial spraying and hand cutting are compared. 2,4,5-T 4 # applied pre-planting in 6 gal of diesel distillate or of oil and water in various ratios gave excellent control of the more susceptible species, including E. micrantha, E. intermedia, E. gummifera, E. trachyphloia and Angophora woodsiana, but gave in general only partial control of E. microcorys, E. resinifera and E. drepanophylla and only top kill of T. conferta and T. suaveolens. 2,4,5-T 1 # was insufficient, but in an unfinished trial preliminary results with 3 # were promising. A volume rate of 3 gal/ac was less effective than 6 gal/ac.

In a post-planting experiment 2,4,5-T 1.75 # in 3.5 gal diesel distillate applied in the dormant season gave excellent control of dense Acacia sp. overgrowth 4-6 ft high, without injuring 1-year old Pinus elliottii 18 in. high. Two-year old pines suffered some defoliation, but no permanent injury. Application during active growth caused serious deformities in the leading shoots of the pines. - D.M.L.S. [O.W.]

307. HAZLEWOOD, F.E. (Union Carbide Australia Ltd.,Walker St.,Rhodes,N.S.W.,Australia). Chemical control of brigalow and lime bush by frill, cut stump and basal techniques. Proc. 2nd Aust.Weeds Conf., 1960, Pap.52, pp.12, tabs.4.

Acacia harpophylla sucker regrowth 15-20 years old and 10-15 ft high was killed by applications of 2,4,5-T and 2,4,5-TP esters in diesel distillage (DD) 1-4% or of DD alone applied in frills, to cut stumps, or as basal sprays. The suckers were also killed by frilling without chemicals. Virgin A. harpophylla 60 ft high was killed by all concentrations of 2,4,5-T and 2,4,5-TP esters in DD and by DD alone when applied in frills, and by the 4% concentration of the esters when applied as basal sprays; 2% 2,4,5-TP and 2,4,5-T in DD killed all trees when applied to complete, but not to incomplete, waist-high frills. DD alone as a basal spray and frilling alone were inconsistent in effect. There was no obvious difference in effect between 2,4,5-T and 2,4,5-TP.

2,4,5-T and 2,4,5-TP esters 1-4% and 2,4-D 4% in DD applied as basal sprays gave excellent control of virgin and sucker or coppice Bremocitrus glauca; 2,4-D 1% had little effect and DD alone no effect.

Little or no translocation between sucker regrowths arising from a common rootstock was observed in these experiments. - D.M.L.S. [O.W.]

308. DONALDSON, T.W. (Dep.Crown Lands & Survey,Melbourne,Australia). Recent research into the control of sweet briar in Victoria. Proc.2nd Aust.Weeds Conf., 1960, Pap.56, pp.5, bibl.3.

1. Overall sprays. All treatments were applied during fruiting of Rubs rubiginosa.

2,4,5-T (butyl ester) was applied in water, dieseline and a 50/50 mixture of water and dieseline at 0.1,0.2 and 0.4%; 2,4,5-T(butoxy ethanol ester) was applied only in water at the same rates. No treatment killed the bushes and it was apparent that to obtain complete eradication several sprayings would be necessary. The 2 esters gave similar results and so did the 3 carriers, except at the lower rates,with which dieseline appeared to increase the effect. No treatment gave better results than 0.2% butyl ester in water which reduced live cane numbers by ca.54%. Amitrole 0.25-1% was ineffective and 50/50 mixtures of amitrole and 2,4,5-T at 0.1-0.4% were no better than 2,4,5-T alone.

2. Basal treatments. 2,4,5-T butyl ester 0.5, 1 and 2% was applied in the same 3 carriers. 2% gave virtually 100% kill with all 3 carriers when applied during fruiting. Applications at the lower rates were more effective in dieseline than in water and gave excellent kill. When applied at the flowering stage, 2% in water gave almost complete kill, but applications in dieseline + water were less effective. Treatments during dormancy in most cases gave top kill only, except for 2% in dieseline. Ethyl ester of 2,4-D applied as a basal treatment at 0.5-2% was ineffective. - D.M.L.S. [O.W.]

309. HAZLEWOOD, F.E. Chemical control of Australian brush species in rights of way. Proc.2nd Aust.Weeds Conf., 1960, Pap.51,pp.20.

General practical information is given based on a 5-year research programme using 2,4-D and 2,4,5-T. A list of the susceptibility to 2,4,5-T of 106 Australian brush species is also given. - D.M.L.S. [O.W.]

310. TRUMAN, R. The chemical control of weed trees as an aid to forest management. Proc.2nd Aust.Weeds Conf.,1960, Pap.57,pp.13.

Eucalyptus maculata. 2,4-D and 2,4,5-T esters at 1 and 4% in dieseline and the amine salt at the same concentrations in water were applied to cut stumps of smaller trees and to frills of larger trees in 4 different seasons of the year. The 2,4,5-T 4% treatments gave the best overall results, the ester being more toxic to larger trees than the amine (trees of 11 in. d.b.h. were killed by the ester, but not by the amine). Seasonal variations were small, but the ester tended to give better results when applied in September and March and the amine in December and June. 1% 2,4,5-T was greatly inferior to 4%. The effectiveness of 2,4-D 4% varied more with time of application than did that of 2,4,5-T; the ester gave 100% kill of frilled trees when applied in September and March and the amine when applied in December. Incorporation of borax 1% with the amine formulations of both compounds had no significant effect. Basal bark applications of 2,4-D and 2,4,5-T esters at 1 and 4% in dieseline were unsatisfactory against the larger trees, but March and June applications of 2,4,5-T butyl ester 4% gave 84 and 89% kill of trees of <2 in. d.b.h. Old coppiced stumps showed higher susceptibility to all treatments and some susceptibility to frilling without chemicals.

An experiment in which stumps cut low and at 12-18 in. high were sprayed with 2,4,5-T butyl ester 4% showed that a delay between cutting and spraying of up to 1 hour could be allowed without affecting the result. The results also indicated that to obtain a complete kill the bark must be sprayed to ground level.

E. crebra. Sodium arsenite 5% and arsenic pentoxide 6% in water applied to frills and cut stumps gave kills averaging up to 75%. AMS 40% in water gave an average kill of 81% for stumps and 70% for frills; AMS crystals were more effective, the average kill being 82% for frilled trees and 90% for stumps.

In another experiment, arsenic pentoxide 5% in water applied in March to cut stumps and to frills failed to prevent suckering; 2,4,5-T butyl ester 4% in distillate gave complete kill of ca. 60% of treated trees when applied to frills and cut stumps and a kill of ca. 90% when applied to the basal bark.

Casuarina leuhmanni. No suckering appeared after March application of 2,4,5-T butyl ester 4% in distillate or arsenic pentoxide in water to cut stumps and frills, or after basal bark applications of 2,4,5-T. - D.M.L.S. [O.W.]

311. DODD, A.P. (Sherwood Laboratory, Sherwood,Brisbane,Australia). Biological investigation projects in Queensland. Proc.2nd Aust.Weeds Conf., 1960, Pap. 4, pp.27.

Opuntia inermis and O. stricta. Complete control has been achieved with Cactoblastis cactorum and ca. 50 000 000 ac of previously infested land has been brought into production. The Queensland Government's policy is to rely entirely on continued biological control of these species.

Opuntia aurentiaca. Chemical control is not generally economic. Dactylopius sp. excercises satisfactory control, but is haphazard in dispersal and periodic distribution from attacked to unattacked plants is required to maintain efficient control.

Harrisia (Eriocereus) martinii and H. (Eriocereus) tortuosa. Chemical control is difficult and costly owing to the production of numerous taproots. No insects

likely to give successful control have yet been discovered.

Lantana camara. The most important insects on this species appear to be: (a) various leaf- or flower-feeding Lepidoptera, (b) at least 2 species of Cerambycid stem borers, (c) Hepialid and Cossid Lepidopterous stem borers, and (d) the lace bugs, Telconemia spp. In Hawaii, 2 leaf-feeding Lepidoptera, the Pyranstid Syngamia haemorrhoidalis and the Noctuid Hypena jussalis, are established and reported to be causing severe defoliation. Another Noctuid (Catabena esula) has become established there, and 2 Cerambycid stem borers have been released. In Queensland C. esula and S. haemorrhoidalis have now been established.

Eupatorium adenophorum. This woody perennial has invaded Queensland from New South Wales and increased rapidly from 1940-50, forming dense stands. Introduction and establishment of the Tephritid gall fly, Proceeidochares utilis, has not succeeded in destroying stands but has reduced their vigour and checked the weed's spread. It may also have been responsible for the development of a leaf spot fungus, Cercospora eupatoriae, which is present in Queensland wherever the weed is found and which often causes severe defoliation.

Baccharis halimifolia. The possibilities of biological control are being examined.

Xanthium pungens. Experimental work with Nupserha antennata and Mecas saturnina, 2 Cerambycid stem borers, has been carried out.

The risks and problems attached to the introduction of insects for the biological control of weeds are discussed. - D.M.L.S. [O.W.]

312. GUNN, J.S. and TATHAM, P.B. (W.African Inst. for Oil Palm Res., Benin City, Nigeria). Diquat as an arboricide. Nature, Lond., 1961, 189, (4767), 808-9.

Rates of 20-40 g diquat, inserted into holes about 8 in. deep at a height of 2-3 ft above ground in trunks of trees 25-30 ft high, gave virtually complete kill of oil palms. A rate of 10 g was insufficient to give complete kill and 2 applications of 10 g spaced 3 weeks apart were not as effective as one of 20 g. There was evidence that the herbicide was translocated extensively within the trees. Diquat, though relatively costly, was considered to be more effective than sodium arsenite. - P.J.B. [O.W.]

313. BOUGARD, M. Prix de revient des debroussaillements chimiques au 2,4,5-T. Sont-ils rentables? [The costs of chemical control of brush by 2,4,5-T. Are they economic?] Bull. Soc. For. Belg., 1960, 67, (6), 229-37, (F.) [O.W.]

OTHER WEEDS AND THEIR CONTROL

See also 216,239.

314. GREAT BRITAIN, MINISTRY OF AGRICULTURE, FISHERIES AND FOOD. Couch or twitch. Adv. Leafl. Minist. Agric. Fish. Fd., 1961, 89, pp.5.

Descriptions of and practical control measures are given for Agropyron repens, Agrostis gigantea, A. stolonifera and Arrhenatherum elatius. - P.J.B. [453(42)]

315. GRANSTROM, B. TCA mot kvickrot. [Control of couch [Agropyron repens] with TCA.] Medd. Jordbruksförsök, 1960, 105, pp.20, tabs.12, bibl.22.

The results of ca. 70 field experiments are reported. In N. Sweden autumn treatment of frozen soil before the snow period is recommended, while in S. and central Sweden application from February-March is more suitable. 20-25 kg/ha gives satisfactory control. Beets and brassicas are very slightly affected by 25 kg/ha applied 1 month before sowing. Potato varieties vary in susceptibility; a tendency to increased tuber size was observed. - From Author's Summary (modified).- D.M.L.S. [164(485)]

316. UNITED STATES, AMCHEM PRODUCTS INC. (Ambler, Pennsylvania, U.S.A.) Progress report on Amitrol-T. Tech. Serv. Data Sheet Amchem Prod. Inc., 1960, H81, pp.10, tabs.10, bibl.10.

Autumn applications of either amitrole 2 # or amitrole + ammonium thiocyanate (Amitrol-T) 4 # did not control Agropyron repens; when applied in spring and ploughed in at 8-12 days later, Amitrol-T gave >80% control, as against 50% with amitrole alone. Control was also more effective with Amitrol-T against Cynodon dactylon, Bromus rigidus and Phalaris arundinacea. Of broad-leaved weeds, Cirsium arvense showed a similar response to amitrole and Amitrol-T. Amitrole 2 # in 80 gal/ac

gave 99% control of Asclepias spp. Cardaria draba, Euphorbia esula, Lonicera japonica and Pueraria thunbergiana were controlled by both. Equisetum spp. and Typha spp. showed greater response to Amitrol-T, which persists longer in damp conditions than does amitrole, and hence is more likely to be effective against aquatic weeds. It is suggested that Amitrol-T should be applied at 1-2 gal (2 lb a.i./gal) in 20 gal water, or 40 gal/ac on uncropped areas. Any subsequent growth may be killed with simazine or atrazine. P.C. [O.W.]

317. AMANN, M. (Inst.Pflanzensch.,Stuttgart-Hohenheim,W.Germany). Bekämpfung des Ackerfuchsschwanzes in Wintergetreide. [Control of blackgrass in winter cereals.] Württemb. Wbl.Landw., 1960, 127, (45), pp.2, tabs.2, bibl.2.

Adequate control of blackgrass [Alopecurus myosuroides] was obtained with autumn applications of calcium cyanamide 3-4 kg/ha, provided that the weeds were dry, were at the seedling stage, and the soil moist. Wheat was not harmed. - P.C. [43(273)]

318. GREAT BRITAIN, MINISTRY OF AGRICULTURE, FISHERIES AND FOOD. Stinging nettles. Adv. Leafl.Minist.Agric.Fish.Fd, 1960, 47 pp.4.

Brief practical recommendations are given for the control of Urtica dioica and U. urens in arable land and grassland. - P.J.B. [438(42)]

319. GREAT BRITAIN, MINISTRY OF AGRICULTURE, FISHERIES AND FOOD. Wild onions and ramsons. Adv.Leafl.Minist.Agric.Fish.Fd, 1960, 313, pp.4, figs.2.

Brief recommendations are given for the control of Allium vineale and A. ursinum. - P.J.B. [428(42)]

320. CARNAHAN, J.A. (Div.Plant Industry, C.S.I.R.O.,Canberra,Australia). Experiments with bracken in non-arable pasture. Proc.2nd Aust.Weeds Conf., 1960, Pap. 8, pp.9, bibl. 12.

The following herbicides were applied in March/April, 1959 to Pteridium aquilinum which had been burnt the previous winter (August): 4-CPA (butoxy ethanol ester) 1, 3 and 9 #, AMS 8.33, 25 and 75 #, amitrole 5, 15 and 45 #, arsenic trioxide (2 formulations, one with cresylic acid) both at 1.33, 4 and 12 #, dalapon (sodium) 5, 15 and 45 #. The plots were reburnt during the following winter and frond counts made during the next growing season. The only treatment to show any significant reduction was 4-CPA at 9 # and here the reduction was only of about 30%. Sowings of a clover/grass mixture made on half the plots in the spring following the first burn failed to result in establishment and the feasibility of autumn sowing after clearing the fronds by "chemical ploughing" is discussed; for this purpose, diquat 2.5 # has given a virtually complete frond kill within a month in a preliminary trial. - D.M.L.S. [O.W.]

321. ALBERT, W.B. (S.Carolina Agric.Exp. Sta.,Clemson,U.S.A.) Control of horsenettle (Solanum carolinense) in pastures. Weeds, 1960, 8,(4),680-2.

A trial was begun in 1955 in an old Bermuda grass [Cynodon dactylon] pasture to determine the cumulative effect on S. carolinense of annual treatment with herbicides. As assessed after 3 successive years' treatment, followed by one year with no treatment, S. carolinense stands were greatly reduced but not eliminated by amitrole 3 # or 2,4-D 2 and 4 #. Chlorobenzoic acids were less effective than amitrole or 2,4-D but mixtures of amitrole 1.5 # + chlorobenzoic acid 1 # or amitrole 1.5 # + 2,4-D 1 or 2 # were highly effective in reducing stands. The Bermuda grass was not significantly injured by any herbicide except amitrole, which caused moderate chlorosis for 30-60 days after application. - From Summary. - P.J.B. [O.W.]

322. FREEMAN, J.F. Nodding thistle [Carduus nutans] control with 2,4-D. Leafl.Univ.Kentucky Coop.Ext.Serv., 1960, 227, pp.3. [15(76.9)]

323. DODD, A.P. (Laboratory, Sherwood S.W.3,Brisbane,Australia). Efforts to eradicate the North American composite, Helenium tenuifolium Nutt. Proc.2nd Aust. Weeds Conf., 1960, Pap. 65, pp.3.

H. tenuifolium causes serious taints in milk and is reputed to be toxic to horses and mules. Efforts over 7 years to destroy an infestation in Queensland by hand-pulling or 2,4-D were unsuccessful, but prevented its spread. Data of seasonal germination and rainfall are given. - D.M.L.S. [O.W.]

324. HOLZ, W. AND RICHTER, W. (Oldenburg, Germany). Die Bekämpfung der Rasenschmiele. [Control of tussock grass (Deschampsia flexuosa).] Landwirtschaftsbl.Weser-Ems, 1960, (34), pp.1, (G.), figs.1.
[264(43)]

325. MEYER, J. (Inst.Pflanzensch.Landwirtschaftliche Hochschule,Stuttgart-Hohenheim, W.Germany). Beitrage zur Biologie und Bekämpfung der Flatterbinse Juncus effusus L. [Contributions to the biology and control of soft rush Juncus effusus L.] Z.Acker. PflBau., 1960,III,(3), 289-316, (G.e.), figs.8,tabs.7,bibl.35.
Seeds of soft rush had high requirements for light and moisture for germination. The establishment of competitive species such as Phleum pratense and Poa trivialis therefore play a major part in suppression of the rush, as does balanced manuring to assist the rapid formation of a thick sward. These methods of control were combined with applications of MCPA (salt and ester), 2,4-D and 2,4,5-T, singly or in combination, doses of + 1 kg a.i./ha were effective. The percentage kill of rush was materially increased where they were mown 14 days after spraying. - P.C. [O.W.]

326. PRYOR, L.R. Perennial herbaceous weeds. Proc.12th ann.Calif.Weed Conf., 1960, 60-2.
Foliar applications of 2,4-D to Cirsium arvense indicate that it is most susceptible at the bud stage. 2 lb a.i./210-295 gal/ac giving control. Comparative trials using amitrole 4 % in 100 gal suggested that this was better than 2,4-D. - P.C. [O.W.]

327. PEARCE, G.A. (Dep.Agric.,St.George's Terrace,Perth,W.Australia). Cape tulip - control and research in W.A. Proc.2nd Aust. Weeds Conf., 1960, Pap. 36, pp.7, bibl.5.
Examples are given of variations in dormancy and germination of corms and seeds of cape tulip [Homeria collina and H. miniata] from different sources and on different sites, and the effect of soil temperature and soil moisture on dormancy is discussed. Burning has been found to reduce dormancy considerably and is as effective after the first rains as during summer. A high incidence of dormancy is usually associated with very wet soil conditions. Dalapon 4.25 % and amitrole 2.5 % kill cape tulip within a few weeks but appear to be less effective if applied late. None of the following have shown any advantage over 2,4-D: TCB [?2,3,6-TBA] + NPA, mecoprop, 2,4-DB, MCPB. - D.M.L.S.
[O.W.]

328. MICHAEL, P.W. (Div.Plant Industry, C.S.I.R.O., Canberra,Australia). The relevance of ecological and physiological studies to the control of soursob (Oxalis pes-caprae L.). Proc.2nd Aust.Weeds Conf., 1960, Pap. 5, pp.5, bibl.3.
Environmental conditions (soil, temperature, rainfall) favourable to O. pes-caprae and changes in oxalate metabolism and/or transport during the plant's life history are briefly described. Metabolic studies indicated that the plant would be most susceptible to control by cultivation at the stage of old bulb exhaustion. However, it was found necessary to repeat cultivation about 2 months later before new bulbs appeared on the rhizomes of regenerated plants. By this means, bulb production was reduced from 60 to 7 cwt/ac on alluvial red clay loam of poor structure and from 20 to 1.3 cwt/ac on shallow, light soil of good structure; in the latter, but not in the former case, the weed population was negligible the following year. For heavier infestations chemical treatment at the stage of old bulb exhaustion, followed by 2 cultivations at monthly intervals, is recommended. - D.M.L.S. [O.W.]

329. DONALDSON, T.W. (Dep.Crown Lands & Survey,Victoria,Australia). Chemical control of golden thistle and artichoke thistle in Victoria. Proc.2nd Aust.Weeds Conf., 1960, Pap. 32, pp.3, bibl.1.
Scolymus hispanicus can be effectively controlled by 2,4-D or MCPA 1 % applied at the rosette stage + similar follow-up treatment 1 year later; 2 + 1 % gave greater top kill during the first year, but final results were no more effective than 1 + 1 %. Ester formulations appeared to be slightly more efficient than sodium or amine salts. A volume rate of at least 20 gal water/ac is necessary where a single treatment only is carried out, but where retreatment is done the following year 5 or 10 gal/ac may be enough. 2,4-DB (sodium) 0.5-2 % was ineffective.
In spot-spraying trials using concentrations of 0.05-0.4%, the following was the order of effectiveness in controlling Cynara cardunculus: (1) MCPA (sodium), (2) 2,4-D (sodium), (3) 2,4-D (amine) and (4) 2,4-D (ester). Mixed esters of 2,4-D and 2,4,5-T and 2,4,5-T (amine) alone were much less effective. Where only 1 application was made, 0.4% was the most effective concentration, but in all

cases respraying was necessary. With 2 treatments 0.2% was only slightly inferior to 0.4%. Best results were obtained when plants were in full leaf, just before the flowering stems emerged. Boom spraying with 2,4-D (sodium) 2-3 # in 10-50 gal gave good top kill, but considerable regrowth occurred the following year. - D.M.L.S. [O.W.]

330. DOUGLAS, G.W. (Dep.Crown Lands & Survey,Victoria,Australia). Ragwort control in Victoria with particular reference to regrowth problems. Proc.2nd Aust.Weeds Conf., 1960, Pap. 35, pp.4, bibl.2.

The following types of regrowth of Senecio jacobaea have been noted after the use of 2,4-D (ester): (a) after spraying with 2-3 # in 40-80 gal water, plants have continued to grow and flower, although some plants have shown typical symptoms of 2,4-D injury; seeds from the flower heads have often been infertile; (b) regrowth from the crown, after total destruction of the upper parts; (c) regrowth from root fragments ca. 3 months after complete kill of the aerial parts; (d) reinfestation 2 seasons after good kills have been reported. The problems arising from S. jacobaea regrowth are discussed, including the economic and practical problems posed by the frequent need to respray with contact herbicides (polyborchlorate, sodium chlorate + calcium chloride mixture, arsenicals). - D.M.L.S. [O.W.]

331. CAYZER, E.P. and JOHNSTON, A.N. (Agricultural Services Pty.Ltd.,Australia). The reaction of Onopordum acanthium L. to several herbicides. Proc.2nd Aust.Weeds Conf., 1960, Pap. 34, pp.6, tabs.1,bibl.5.

In long-term pasture development the most suitable method of controlling Onopordum spp. is by sowing perennial grasses such as Phalaris tuberosa which compete effectively once they are established.

In a preliminary trial, observation 3 months after treatment indicated excellent control (with little difference between the results) from both amitrole 0.75 and 1.5 # when applied with equal amounts of ammonium thiocyanate. Amitrole alone at 0.5-3 # or at 0.75 # + 2,4-D (ester) 0.325 # was much less effective, and the following gave poor results: 2,4-D (amine and ester) 0.325-0.75 # + amitrole 0.5-0.75 #, 2,4-D amitrole) 0.75 #, 2,4-DB (low volatile ester) 1 #, atrazine 2.5 #. - D.M.L.S. [O.W.]

332. BISSET, W.J. Overcoming white spear and Yabila grass problems. Qd agric.J., 1960, 86,(7), 401-6, figs.3.

Panicum queenslandicum and Aristida leptopoda are both highly unpalatable to stock and, in addition, A. leptopoda is also a serious sheep pest during its seeding period as the seed can penetrate the wool skin and even the flesh. The history of pasture degradation and the reasons for the prevalence of these species in the Central Highlands of Queensland is discussed. A. leptopoda can be controlled by cropping and allowing the area to revert to natural pasture, when bluegrass will compete successfully against it. To control P. queenslandicum, summer burning, preferably after the first summer storms, followed by protection from grazing for 3-6 months to allow bluegrass to establish, is recommended. - D.M.L.S. [O.RE.]

333. ANNAND, A.M. and CUTHBERTSON, E.G. (Union Carbide Australia Ltd.) Chemical control of skeleton weed in wheat undersown with subterranean clover. Proc.2nd Aust. Weeds Conf., 1960, Pap. 30, pp.11, tabs.3, bibl.5.

The following were applied when subterranean clover was flowering and Chondrilla juncea was at all stages from rosette to flowering (rain prevented spraying at the optimum stages): 2,4-D (ethyl ester, amine and sodium) 0.5 and 0.75 #, 2,4-DB (ethyl ester and amine) 0.5 and 0.75 #, MCPA (sodium) 0.75 and 1 #. MCPB (sodium) 0.75 and 1 #. All treatments except MCPB 0.75 # significantly reduced clover regeneration, the most severe effects being caused by 2,4-D. The 2,4-DB (ethyl ester) and the 2,4-D treatments gave the best (82-96%) control of C. juncea. The best combination of good C. juncea control (90%) with lack of severe injury to the clover was given by 2,4-DB (ethyl ester) 0.5 #; this treatment reduced regeneration by about one third. - D.M.L.S. [O.W.]

334. McCANN, J. (Dep.Agric.,Melbourne, Victoria,Australia). Experiments in the control of skeleton weed (Chondrilla juncea L.) in the Mallee District of Victoria. Proc.2nd Aust.Weeds Conf., 1960, Pap. 41, pp.11, tabs.6,bibl.9.

In experiments on loamy and sandy soils, best control of C. juncea (90%) and highest wheat yields were obtained when

sulphate of ammonia 120 # was applied to the crop in July, followed by spraying with 2,4-D (ester) 0.75 # in 7 gal water when the weed began upright growth. Fertiliser application in May produced a significantly lower wheat yield and so also did 2,4-D (ester) 0.75 # in 14 gal/ac without fertiliser, but the latter treatment gave 80% control of the weed. At 0.75 # 2,4-D (ester) was significantly more effective than MCPA (sodium). On sandy soil, although the weed population was significantly reduced by all spray treatments, it increased on all plots in the year following treatment. This was in contrast to the results on loamy soil and is explained by the fact that on sandy soil, C. juncea reproduces vegetatively from lateral organs as well as from the main axis. There was no conclusive difference in effect between volumes of 7 and 14 gal/ac.

Fallow spraying. In 2 years' tests, spraying C. juncea with MCPA 1 # and 2,4-D (ester) 0.75 # on fallow up to 50 days before sowing wheat (in addition to spraying at the normal time) failed to increase wheat yields on sandy soils. In 1 of the years, both 2,4-D and MCPA applied 50 and 20 days before sowing adversely affected wheat growth.

In 1 experiment on sandy soil, spraying C. juncea with 2,4-D (ethyl ester) 1 # for 2 years in succession reduced the weed, but did not eradicate it; increasing the rates to 6 # showed no great advantage, and 1 # in split doses with an interval of 4 days was no better than in a single dose.

"Borascu" (sodium borate ore, boron trioxide 63%) and "Polyborchlorate" (3:1 mixture of sodium borates and sodium chlorate), applied on sandy soil at 10 and 6 lb/100 ft^2, respectively, eradicated C. juncea within 2 years, the "Polyborchlorate" having the more rapid effect. - D.M.L.S. [O.W.]

335. MOORE, R.M. and ROBERTSON, J.A. (Div. Plant Industry, C.S.I.R.O., P.O. Box 109, Canberra, Australia). Studies on skeleton weed (Chondrilla juncea L.) in the New South Wales wheatbelt. Proc. 2nd Aust. Weeds Conf., 1960, Pap. 42, pp.8, figs.2, tabs.3, bibl.1.

(a) On uncropped land. 1 year after treatment, populations of C. juncea were not effectively reduced by salts and esters of 2,4-D, MCPA or 2,4,5-T at rates of 0.75-24 #. 2,4-D was slightly superior to MCPA in most cases and both were superior to 2,4,5-T and 4-CPA. There was little difference between 2,4-D formulations, but esters tended to be better than salts under extremes of hot, cold, dry or wet conditions. Best results were obtained from spring applications in the rosette stage and worst from treatments during flowering. Increasing the rate above 3 # of esters and 6 # of salts did not increase the control.

(b) Control in wheat. Spraying in spring with 2,4-D (sodium) 2-32 oz/ac when wheat was 7-15 in. tall and C. juncea in the rosette stage increased wheat yield by from 2.3-4.7 bushels/ac and even at 2 oz/ac reduced the height of the weeds sufficiently to prevent interference during harvesting; there was no permanent effect on rosette density. Wheat yields were low which was attributed to competition between C. juncea and wheat for nitrogen.

(c) Competition between C. juncea and pasture spp. The following changes in C. juncea density and dry weight (compared with untreated controls) resulted after sowing pasture species in April 1952 in a heavily infested old wheat field fertilized at the beginning of the experiment with superphosphate at 8 cwt/ac.

Pasture Species	Chondrilla juncea Densities				Dry Weight
	Oct. 1953	Sep. 1954	Aug. 1955	Aug. 1956	Aug. 1956
Wimmera ryegrass 12 #	+11%	-6%	-16%	-19%	-3%
Subterranean Clover 6 #	-48%	-64%	-61%	-63%	-80%
Wimmera ryegrass 6 # + Subterranean clover 3 #	-15%	-53%	-51%	-41%	-43%

(d) Effect of pasture leys and spraying on C. juncea control and wheat yields. The results are given of an experiment in which leys of Wimmera ryegrass, subterranean clover and a mixture of the two were ploughed, sown with wheat 2 years later, and sprayed with 2,4-D 0.75 # (1) in the fallow 6 weeks prior to sowing, (2) in the growing wheat crop and (3) in both fallow and crop. It was concluded that C. juncea could be considerably reduced by a subterranean clover ley of 2-3 years; leys of longer duration might increase the risk of lodging. Farmer's evidence suggests that selective grazing of the weed by sheep on a short clover ley,

combined with cultivation during subsequent cropping, may obviate the necessity for spraying. - D.M.L.S. [O.W.]

336. EVANS, D.C. (Temora Exp.Farm,N.S.W., Australia). Trial on eradication of skeleton weed occurring in small patches. Proc.2nd Aust.Weeds Conf., 1960, Pap.48, pp.6, tabs.2.
The following gave 97-100% control 21 months after application: sodium chlorate 200 #, polyborchlorate (49% boron trioxide, 25% sodium chlorate) 800 # (but not 400 #), DB granular (55% disodium tetraborate pentahydrate, 33.5% disodium tetraborate decahydrate, 7.5% 2,4-D) 1200 # (but not 800 #), Borascu (63% boron trioxide) 1600 #, MCPA 25 #. 2,4-D (sodium) was less effective than MCPA. Ureabor (sodium borate 94%, monuron 4%) at 800 # gave 73% control, but was ineffective at 400 #. The following gave poor results: amitrole 4-16 #, simazine 25 and 50 #, and monuron 25 and 50 #. The % control of ground cover of species other than skeleton weed [Chondrilla juncea] is given. - D.M.L.S. [O.W.]

337. DOUGLAS, G.W. (Vermin & Noxious Weeds Destruction Board,Treasury Place, Melbourne, Australia). The skeleton weed problem in Victoria. Proc.2nd Aust.Weeds Conf., 1960, Pap. 61, pp.4, bibl.2.
The distribution of skeleton weed [Chondrilla juncea] in Victoria is described, research work already undertaken is briefly discussed, and a programme for future research suggested. D.M.L.S. [O.W.]

338. CARNAHAN, J.A. (Div.Plant Industry, C.S.I.R.O.,Canberra,Australia). Experiments with serrated tussock in non-arable pasture. Proc.2nd Aust.Weeds Conf., 1960, Pap. 10, pp.11.
The results are analysed of a trial in which dalapon (sodium) 0.85-6.8 # was applied (1) + amitrole 0.8 #, and (2) ca. 1 month after burning-over. A subterranean clover/Wimmera ryegrass mixture at 0 and 12 # was sown on the same day as the herbicides were applied in (1) and 12 days after burning-over in (2). Superphosphate at 3 cwt/ac was applied to plots receiving the seeds mixture.
Amitrole had no effect on Nassella trichotoma either directly or used as an activator with dalapon. N. trichotoma was significantly reduced by dalapon, particularly at 3.4 and 6.8 #, within the first 6 months, but recovered fairly rapidly except where the dalapon was applied to young regrowth following burning. Oversowing with pasture species caused apparent reductions in tussock which were probably related to the subterranean clover component, as the ryegrass never became established. Burning appeared to improve the effects of dalapon, but is not always considered advisable. - D.M.L.S. [O.W.]

339. DONALDSON, T.W. (Vermin and Noxious Weeds Destruction Board,Treasury Place, Melbourne,Australia). A note on the occurrence of serrated tussock in Victoria. Proc.2nd Aust.Weeds Conf., 1960, Pap. 62, pp.2.
The history and locations of Nassella trichotoma infestations are briefly described. - D.M.L.S. [O.W.]

340. KEHOE, J.K. (Dep.Agric.,Treasury Gardens,Melbourne,Australia). The control of burgans in East Gippsland. Proc.2nd Aust.Weeds Conf., 1960, Pap. 7, pp.6, bibl.4.
Kunzea peduncularis is described and distinguished from Leptospermum scoparium. Biological methods, using insects, and sprays of 2,4-D and 2,4,5-T (ester) alone and in mixtures have been tried but do not appear to offer practicable control. The author recommends removal of the roots and larger limbs by mechanical means (bulldozers fitted with "grubber" type blade or root rake are suggested) followed by cultivations with a heavy stump-jump disc plough and appropriate pasture improvement. In areas to be reafforested, complete control has been achieved by establishing pine plantations after scrub clearance and cultivation. - D.M.L.S. [O.W.]

341. ANNAND, A.M. (Union Carbide Australia Ltd.) Chemical control of prickly pear (Opuntia inermis D.C.). Proc.2nd Aust. Weeds Conf., 1960, Pap. 31, pp.14.
Five screening trials carried out during 1954-6 are described. The best results were obtained with 2,4-D/2,4,5-T mixed esters and the butyl ester of 2,4,5-T alone. The low cost of this mixture has resulted in its being chosen by the Prickly Pear Destruction Commission, and at 0.2 lb/gal diesel distillate overall sprays have given good results, with very little

regrowth for several years. Cutting the stems of large plants close to the ground before spraying produced faster results. Spring and summer application appeared to be more effective against the larger plants; small and young plants were killed satisfactorily during the cooler months also, but more slowly. Lighting kerosene and diesel distillate gave results similar to those with solvents. A pear-stabbing gun was ineffective for applying the hormone herbicides, and a knapsack sprayer less effective than an atomiser. PCP and INOC dissolved in creosote, used alone or with the growth regulators, and 2,4,5-TP 0.1 lb/gal were all unsatisfactory. Arsenic pentoxide 1.5 and 3 lb/gal water, applied either with a stabber or overall, gives good control but is hazardous. - D.M.L.S. [O.W.]

342. EDYE, L.A. and ISBELL, R.F. (Cunningham Lab., Mill Road, St.Lucia, Queensland, Australia). The Harrisia cactus problem and possible ecological control. Proc.2nd Aust.Weeds Conf., 1960, Pap. 9, pp.7, bibl.7.

It is estimated that ca. 10 000 ac in Queensland are infested with dense stands of Harrisia martinii and that scattered plants occur on nearly 100 000 ac. The life history and ecology of H. martinii is discussed. Its preference for forest environment and inability to invade grassland indicates that economic control might be achieved by burning, followed by ploughing and sowing a pasture mixture, for which purpose Sorghum almum appears to be promising. Repeated spraying, or injection around the roots, with arsenic pentoxide 1 lb/gal gives effective control of scattered plants, but is costly. Investigations into biological control have so far given no positive results. - D.M.L.S. [O.W.]

343. CHRISTIE, G.A. Nut grass. Cane Grs' quart.Bull., 1960, 23, 116-7.

Cyperus rotundus was eliminated by fumigation with methyl bromide at 1.5 lb/100 ft2, also by heavy dressings of 2,4-D. - Hort.Abstr., 30,5314.

344. STRIDE, G.O. (Cunningham Lab., Mill Road, St.Lucia, Queensland, Australia). Present investigations into the biological control of noogoora burr (Xanthium pungens). Proc.2nd Aust.Weeds Conf., 1960, Pap. 2, pp.2.

The life history of Mecas saturnina, a North American beetle, is described. It is considered to be potentially very destructive to isolated plants of X. pungens, but unlikely to affect solid stands greatly. Hupserha antennata, an Indian beetle, whose life history is similar to that of X. pungens, is considered better suited to the Australian climate. Investigations into the use of 2 cerambycid beetles - Dectes spinosus and D. brevisetosus - and of the larvae of an Indian moth of the genus Eublemma are proposed. - D.M.L.S. [O.W.]

345. DOUGLAS, G.W. and SCHMIDL, L. (Dep. Lands & Survey, Victoria, Australia). A review of biological control of noxious weeds in Victoria. Proc.2nd Aust.Weeds Conf., 1960, Pap. 1, pp.6, bibl.3.

1. Hypericum perforatum. Chrysomela hyperici and C. gemellata have had cycles of effectiveness and have been particularly effective in open country, but are less so in eucalyptus forest. In general, they have not held infestations adequately in check. Agrilus hyperici has not been successfully established. Leucidiplosis giardi has been established, but is not yet exercising any control.

2. Senecio jacobaea. The life history of Tyria jacobaea, the Cinnabar moth, is outlined and attempts to establish it in Victoria described. Pegohylemyia jacobaea has been released in one area. - D.M.L.S. [O.W.]

346. EVANS, D.C. (Temora Experiment Farm, Temora, N.S.W., Australia). Preliminary investigations into broomrape in the Cootamundra district. Proc.2nd Aust.Weeds Conf., 1960, 60, pp.4.

Sampling of a well-established subterranean clover stand heavily infested with Orobanche minor and skeleton weed [Chondrilla juncea] showed that 5 plants of O. minor per square link [1 link = 20.117 cm] reduced clover weight by 25% and 17 plants per square link by 50%. These reductions occurred independently of the density of C. juncea, although no infestations in C. juncea-free plots were examined.

Hosts of O. minor recorded in New South Wales were: subterranean clover, C. juncea, saffron thistle [Carthamus lanatus], hop clover, Pelargonium sp., Bellis perennis, sweet peas, roses and nasturtiums. From the following observations C. juncea appeared to be of great importance as a host: (a) it was associated with every infested area examined; (b) on some infested areas C. juncea was the only species present;

(c) measures which controlled C. juncea in clover stands appeared also to control O. minor; (d) the majority of O. minor plants examined for root attachment were parasitising C. juncea.

Infestation of Dwalganup subterranean clover stands appeared weaker, patchier, and more dependant on the presence of C. juncea than infestations in the Mount Barker variety.

Invasion appears to be more frequent in areas of low fertility. The Orobanche sp. examined was grazed by sheep and there was no regrowth from eaten-off stems. This is contrary to overseas experience and suggests that the species in question may not be O. minor.

Control appears possible (1) by raising fertility and/or control of C. juncea, and (2) by grazing and the prevention of seed setting. O. minor was thought not to perennate under hot dry conditions. - D.M.L.S. [O.W.]

347. WESTHORELAND, W.G. (N.Carolina State Coll.,Raleigh,U.S.A.) Where we stand with witchweed. Weeds, 1960, 8,(4),678-9.

Progress in the current Federal programme for the eradication of witchweed [Striga asiatica] is reviewed. - P.C. [O.W.]

348. ROCHECOUSTE, E. and VAUGHAN, R.E. Weeds of Mauritius. No. 6. Argemone mexicana Linn. (Cardon). Leafl.Mauritius Sug.Indust. Res.Inst., 1960, 4, pp.3, figs.1.

A botanical description, together with a note on its distribution is given. The plant is said to be easily controlled by MCPA or 2,4-D at 1.5-2 lb. a.e. - P.J.B. [21(698.2)]

CHEMISTRY, PHYSICS, TOXICOLOGY, RESIDUES AND SOILS

349. BORRELL, P. (Dep.Physical Chem.,Lensfield,Cambridge,England). The molecular decomposition of aliphatic carbonyl compounds. Nature, Lond., 1960, 188,(4755),1002-6, figs.1,bibl.21.

350. BATCHELDER, G.H. and PATCHETT, G.G. (Stauffer Chem.Co.,Richmond,California,U.S.A.) A colorimetric method for the determination of EPTC residues in crops and soils. J.Agric. Fd Chem., 1960, 8,(3),214-6, tabs.3,bibl.3.

EPTC is hydrolyzed in sulphuric acid to di-n-propylamine from which is formed the cupric dithiocarbamate complex having an absorption peak at 444 mμ. Crop and soil extraction procedures are presented. - Authors' Summary. [O.W.]

351. ECKSTEIN, Z. [Some problems of obtaining weed-killers. IX. The action of active bromine on phenoxyacetic acids.] Rocz.Chem., 1958, 32,(6),1357-63, (Polish. e.).

352. GUTTMANN, W.H. and LISK, D.J. (Dep.Entomology State Coll.Agric.,Cornell Univ.,Ithaca,New York,U.S.A.) Improved extraction procedure for the determination of EPTC residues in potatoes. J.Agric.Fd Chem., 1960, 8,(3),216-7, tabs.1,bibl.1.

Potato tubers are blended with isopropyl alcohol and Skellysolve B (n-hexane). After filtering, hexane separates and is collected. The aqueous isopropyl alcohol is extracted with hexane. The combined hexane extracts are evaporated and EPTC then determined. Stable emulsions do not form when isopropyl alcohol is used. Recovery of 0.1 p.p.m. EPTC from tubers ranged from 93.5 to 99.0%. Analysis of tubers treated with EPTC for weed control showed no residue. - Authors' Summary. [O.W.]

353. KULIKOV, A.I. Nitraphen, a new insecticidal, fungicidal and herbicidal preparation. Vestn.s.-kh.Nauki, 1960, 5,(2),123-4, (Russ.e.f.g.), bibl.3.

Nitraphen (sodium salts of the nitrification products of alkylphenols) has given good control of broad-leaved weeds and dodder [Cuscuta sp.] in some agricultural crops. - From Hort.Abstr., 30,5222. - D.M.L.S.

354. RUDBURG, C.B., ENGEL, R.E. and MEGGITT, W.F. (Rutgers Univ.,New Brunswick, New Jersey,U.S.A.) Effect of temperature on the herbicidal activity and translocation of arsenicals. Weeds, 1960, 8,(4), 502-8.

Digitaria sanguinalis, grown in pots, was treated when the main culm was 10-12 in. high with disodium monomethylarsonate (DMA) 2, 6 and 18 lb., cacodylic acid, 1, 3 and 9 lb. and sodium arsenite (As_2O_3 base) 0.5, 1.5 and 4.5 lb. The plants were held at 60, 75 and 85°F and harvested 10 days after

treatment. The phytotoxicity of DMA, as shown by chlorosis, increased as temperatures increased. Temperature did not appear to influence the degree of contact injury, or the herbicidal effect of cacodylic acid or sodium arsenite. In a second series of experiments, the 3 herbicides were applied at 2, 12 or 20 # as follows: (a) one quarter of the total amount on the 1st, 3rd, 5th and 7th day, (b) half the total amount on the 1st and 4th days, (c) the full amount on the 1st day. The plants were held at 60 or 90°F and harvested 11 days after the treatments began. The herbicidal effect of DMA 20 # applied as (c) tended to be greater than when applied as in (a) or (b). In a third series of experiments, the translocation of arsenic applied as labelled DMA to D. sanguinalis and soybean plants at 60 and 85°F and of arsenic applied as labelled sodium arsenate to soybeans at 85°F was studied. Arsenic applied as DMA to both species was translocated more rapidly at 85°F than at 60°F. Arsenic applied as sodium arsenate was translocated less rapidly than that applied as DMA. - P.J.B. [O.W.]

355. SHAFFER, C.B. (American Cyanamide Co.,30 Rockefeller Plaza,New York 20,U.S.A.) Toxicological studies on aminotriazole. Proc.12th ann.Calif.Weed Conf., 1960, 4-6.
Amitrole does not exhibit acute toxic properties, but has anti-thyroid (goitrogenic) activity if fed for periods of 1-2 years at a minimum of 50 p.p.m. by weight of food. - P.C. [O.W.]

356. LEAVITT, R.H. (Indust. & Biochem. Dep., du Pont de Nemours & Co.,Inc.,U.S.A.) Chlorobenzoic acid weed-killers. Proc.12th ann.Calif.Weed Conf., 1960, 13-16.
Two types of chlorobenzoic acid weed killers have been made available following extensive screening. The dimethylamine salts of trichloro- and polychlorobenzoic acids at 20 # control morning glory [Ipomoea spp.], Russian knapweed [Centaurea repens], Canada thistle [Cirsium arvense], and other broad-leaved weeds. At this rate, they act as non-selective soil sterilants, especially where annual rainfall does not exceed 20 in. 20 # should be applied in not less than 40 gal/ac, or 10 gal/ac if applied from the air. - P.C. [O.W.]

357. CORKE, C.T. and ROBINSON, J.B. (Dep.Microbiol.Ontario Agric.Coll.,Guelph, Ontario Canada). Herbicides and the soil population. Proc.7th ann.Meet.agric.Pest. Tech.Soc.[Canada], 1960, 69-72, figs.7.
The action of atrazine, DNOC, fenac, simazine, monuron, diuron and amiben on nitrification and carbon dioxide evolution by bacteria was studied. At field rates none showed any appreciable effect on CO_2 production, indicating that the soil flora was not inhibited. 2,4-D induced a build-up of soil bacteria capable of de-toxicating it, with a consequent diminution in its herbicidal effectiveness the following season. - P.C. [O.W.]

358. CHANDRA, P., FURTICK, W.R. and BOLLEN, W.B. (Oregon Agric.Exp.Sta.,Corvallis, U.S.A.) The effects of four herbicides on microorganisms in nine Oregon soils. Weeds, 1960, 8,(4),589-98.
2,3,6-TBA, EPTC, diuron, and simazine were applied to widely differing soil types at concentrations giving 5 and 100 p.p.m. in soil (the former approximating to field rates of application). Microbial activity was estimated by measuring the amount of CO_2 evolved. All herbicides tested reduced the level of microbial activity in most cases for at least 28 days, compared with untreated soils, but soil type and environmental factors appeared to have more influence on the effect of herbicides on microbial activity than did either the type of herbicide or its rate of application. - P.C. [O.W.]

359. RAUSER, W.E. and SWITZER, C.M. (Bot. Dep.,Ontario Agric.Coll.,Guelph,Ontario, Canada). A study on the persistence of certain herbicides in the soil. Proc.7th ann. Meet.agric.Pest.Tech.Soc.[Canada], 1960, 64-6, tabs.3,bibl.3.
A biological assay test was developed for studying the persistence of amiben (3-amino-2,5-dichlorobenzoic acid), using oat seedlings. Amiben was incorporated at 0.25, 0.5, 1, 2, 4 and 6 # into soil in waxed paper cups; 10 oat seeds were sown in each, and the above-ground growth harvested 3 weeks later. There was little build-up of herbicide in the soil, because of microbiological breakdown. Little leaching appeared to take place and much of the amiben appeared to be fixed in the top 2 in. of soil. - P.C. [O.W.]

360. JORDAN, L. (Univ.California,Riverside, U.S.A.) Factors affecting the decomposition of amitrole in soils. Proc.12th ann.Calif. Weed Conf., 1960, 78-9. [O.W.]

361. GANTZ, R.L. and SLIFE, F.W. (Dep. Agron.,Univ.Illinois,Urbana,U.S.A.) Persistence and movement of CDAA and CDEC in soil and the tolerance of corn seedlings to these herbicides. Weeds, 1960, 8,(4), 599-606.

In studies on the persistence of CDAA and CDEC 50 g samples of Muscatine silt loam soil were sprayed with these herbicides at rates equivalent to 8 #. The soil was then stirred thoroughly before being held either in a dry or a moist condition for 0, 2, 4, 6 or 8 weeks at temperatures of 40, 60, 80 or 100°F. Both herbicides remained active (as measured by cucumber root growth) for 2-4 weeks longer at 80 and 100°F in dry than in moist soil. In moist soil, the toxicity of both herbicides had disappeared within 6 weeks after storage at 80 and 100°F, while at 40 and 60°F, there was little apparent breakdown of either. These results indicated that CDAA and CDEC were probably inactivated biologically and it was concluded that under Corn Belt conditions, these herbicides were unlikely to cause any residue problems. In a second series of experiments, columns of Muscatine silt loam and Oquawka sand soils 6 in. high were treated with CDAA and CDEC at 4 # and leached with 4 surface in. of water.

CDAA was leached to a much greater extent than CDEC in both soils, but its toxicity in the top in. layer of the silt loam soil was retained at a high level, which was attributed to adsorption. CDAA toxicity was largely removed from the sand soil by leaching. With CDEC, phytotoxicity was not evident at layers deeper than 2 in. in the silt loam after leaching, while in the sand soil, phytotoxicity was evident at depths down to 4 in. CDAA was more phytotoxic than CDEC in the silt loam, but both were equally toxic in the sand soil.

In further experiments, young maize seedlings showed a relatively high degree of physiological tolerance to CDAA and CDEC in the silt loam soil and no significant inhibition of root growth was caused by either herbicide at rates less than 8 #. These results were considered to indicate that CDAA was more suitable on moderate or heavy textured soils and CDEC on sandy or light soils. -- P.C. [O.W.]

362. ROADHOUSE, F.E.B. and BIRK, L.A. (Dep.Chem.,Ontario Agric.Coll.,Guelph, Ontario,Canada). Penetration and persistence in soil of 2-chloro-4,6-bis(ethylamino)-s-triazine (simazine). Proc.7th ann.Meet.Agric.Pest.Tech.Soc.[Canada], 1960, 63. [O.W.]

363. GAST, A. (Geigy A.G.,Basel,Switzerland). Neuere Erfahrungen mit simazin im Rebbau. [Recent experiences with simazine in viticulture.] Schweiz.Z. Obst.u.Weinbau, 1960, 6,(9), (G.), figs.1.

The movement of simazine in soil was studied in cylinders in which the surface was treated with simazine 20 kg/ha. A monthly equivalent of 40 mm rainfall was applied gently, so as to avoid leaching. The soil of individual cylinders was removed in 5 cm layers at monthly intervals and tested for herbicidal activity using Sinapis alba as a test plant. Soil from a depth of 10 cm tested at one month after applying simazine killed S. alba; taken at 2 and 3 months the kill was evident only in soil from a depth of 5-10 cm; and taken at 4 months, only in the top 5 cm, indicating that simazine lost its activity from below upwards. The activity of applications of 40 kg/ha extended to twice the depth of those of 20 kg/ha, but also showed a tendency to disappear from below upwards. Vines showed a strong resistance to simazine, even when roots were in direct contact with treated soil, and appeared to be able to break it down. P.C. [37(494)]

364. ASHTON, F.M. (Univ.Calif.,Davis, U.S.A.) Soil factors affecting the effectiveness of pre-emergence herbicides. Proc.12th ann.Calif.Weed Conf., 1960, 10--11.

Herbicides which were applied to the surface and subsequently furrow-irrigated, remained on the surface, but moved laterally; if soil-incorporated after surface application they moved downward and laterally. The degree of solubility of a herbicide appeared to have little or no effect on its movement in the soil. Sprinkler irrigation provided a means of incorporating pre-em. herbicides into the soil and thus materially increased their effectiveness. -- P.C. [O.W.]

365. SCOTT, E.G. (Bot.Dep.,Univ.California, Davis,U.S.A.) The relative toxicity of three boron compounds and sodium chlorate used as soil sterilants. Weeds, 1960, 8,(4),645-56, figs.9,bibl.12.
Four different soils were treated with sodium chlorate, sodium tetraborate, sodium metaborate and sodium pentaborate. Oats, barley and sunflower were used as test plants. As a result of accumulation within the plant, borates were significantly more toxic than sodium chlorate, whose toxicity depended on the individual susceptibility of the species. Increasing the borate:chlorate ratio in mixtures tested under identical conditions decreased the effectiveness of the mixtures on barley, while retaining it on oats. As a general soil sterilant, mixtures of sodium chlorate and sodium borate give maximum effectiveness when mixed in a borate:chlorate ratio greater than 4:1. - P.C. [O.W.]

366. CRÜGER, G. Erddämpfungoderchemische Bodenentseuchung- ein Kostenvergleich. [Soil sterilization by steam or by chemical disinfection: a comparison of cost.] Reprint Rhein.Mschr.Obstb., 1960, 2, pp.2, (G.), bibl.7.
Surface treatment with chlorpicrin or SMDC tends to be cheaper than steam sterilization. - From Hort.Abstr., 30,4680. - D.M.L.S.

367. * BEDDING, A.J. Modern advances in soil sterilisation: the partial sterilisation of soil, with particular reference to modern methods.] M.Sc.Thesis (Diss.), Univ.London.

APPLICATION AND MACHINERY

368. AKESSON, N.B. (Univ.California, Davis,U.S.A.) Weed control chemicals application equipment research. Proc.12th ann.Calif.Weed Conf., 1960, 62-5.
An account is given of current work on the following aspects of herbicide application: mixing of chemicals in the soil with various powered and non-powered tools; low-pressure, coarse-droplet sprays of non-drift character; nozzles and drift; aircraft application, and climatological factors. - P.C. [O.W.]

369. RIPPER, W.E. (Dow Agrochemicals Ltd., 48, Charles St.,London,England). The effect of wetting agents on herbicidal activity of dalapon. Mimeo. Publ.Dow Agrochemicals Ltd., 1960, pp.4.
A review of work on the mode of action and uses of wetting agents used with herbicides. - P.C. [419(42)]

370. KURTH, H. (Landwirtschaft.Versuchsstation, Lemna,E.Germany). Methoden zur Vorprüfung von Herbiziden. [Methods of screening herbicides.] Nachr.Bl.dtsch.PflSchDienst.,Berlin, 1960, 14,(11),230-36, (G.russ.e.), figs.4,tabs.3, bibl.4.
Two field screening test procedures, one for pre-em. and the other for post-em., are described, with examples. - P.C. [O.W.]

371. ANTOGNINI, J. (Stauffer Chem.Co., Mountain View,California,U.S.A.) Soil incorporation of herbicides. Proc.12th ann.Calif. Weed Conf., 1960, 112-4.
Advantages of soil incorporation of pre-em. herbicides are listed as: (a) increased activity of material, (b) decreased variability of results, (c) emergent seedlings are destroyed at incorporation. Discs, harrows and rotary tillers are used, none of which shows any special advantages over the others. - P.C. [O.W.]

372. WOOTEN, O.B., McWHORTER, C.G. and RANNEY, C.D. Qualitative analysis for applicators of soil-incorporated chemicals. Pap. Mississippi Delta Br.Exp.Sta.,Stoneville, 1960, 60-109, pp.18, figs.11,tabs.1,bibl.12.
Techniques for using fluorescent tracers for determining the distribution of soil-applied chemicals are described. The following methods of incorporating chemicals into the soil were evaluated: (a) application to the seed furrow during sowing, (b) application to the soil surface, followed by incorporation with a disc harrow or rotary hoe, (c) application with a sub-surface applicator. With (b), most of the fluorescent tracer remained on the soil surface after a single harrowing. The second and third harrowing improved the distribution of the tracer and 3 harrowings appeared to give as good distribution as 6. Rotary hoeing resulted in as effective mixing as one passage with the disc harrow. With (c), the tracer was applied from two horizontal blades 20 in. long, with the spray nozzles facing rearward and enclosed in the angle

between the blades. Nozzles which produced circular and square spray patterns resulted in only slight vertical spread of the sprayed tracer, most of which was confined to a thin horizontal line. A horizontally aligned, fan-type nozzle incorporated the spray into a layer 0.25 in. thick in a band which could be varied in width from 6 to 16 in. The use of a rotary hoe attachment behind the underground applicator resulted in uniform mixing of the tracer in the top layers of the seedbed. In a trial in 1959, EPTC 5 lb. was applied with a sub-surface applicator (a) at depths of 2 or 6 in., (b) at 2 in. followed by rotary hoeing, or (c) to the soil surface followed by rotary hoeing. Best control of weeds (9 on a scale 0-10) was given by (a) followed closely by (b). - P.J.B. [45(76.2)]

373. AKESSON, N.B. and YATES, W.E. (Univ. California, Davis, U.S.A.) Aircraft spraying of the viscous invert emulsion. 12th ann. Calif. Weed Conf., 1960, 95-100, figs.1.
Aircraft spraying tests showed 2 or 3 times more drift with water than with invert (water/oil) emulsion. Normal emulsion (oil/water), being less viscous than invert, also gave greater drift. The invert emulsion did not entirely eliminate small drops, and has been successful only for brush control. - P.C. [O.W.]

374. COURSHEE, R.J. (Nat. Inst. Agric. Engng, Wrest Park, Silsoe, Beds., England). Crop-spray drift. Flight, 1960, 607.
Aspects discussed include means of reducing the high cost of spraying crops from the air by extending the spraying season. In Great Britain, this will entail applying herbicides from the air, as this is virtually the only type of spring work available. The problem of drift is considered and means of reducing it outlined. - P.J.B. [437(42)]

375. CORKINS, J.P. (Naugatuck Chemical Co., U.S.A.) Foliar absorption of pesticides. Proc. 12th ann. Calif. Weed Conf., 1960, 18-23, tabs.9.
The results of investigations of the role of surfactants, humectants and stickers in the foliar absorption of herbicides and the effect of temperature, humidity and stomatal behaviour are reviewed. - P.C. [O.W.]

376. BONDARENKO, D.D. Little difference in results shown by granular or liquid herbicides. Ohio Fm Home Res. 1961 46 (1), 3, 15. [50(77.1)]

377. GREAT BRITAIN, FARMERS' WEEKLY. Weed and bug killers will come in pellets. Fmrs' Wkly, 1960, 53 (20) 48. [O.W.]

378. WALKER, P.T. and SELWAY, M. (Col. Pest. Res. Unit, Porton, Salisbury, England). The retention on maize of granules, as used for the insecticidal control of stalk borers. C.P.R.U., Porton, Rep.No. 178, 1960, pp.7, figs.1, tabs.3, bibl.4.
More granules were retained by the leaves of a wet plant than by those of a dry plant. The proportion of granules found on the leaves to those found in the central whorl was 1:3.4 for dry plants, and 1:0.5 for wet plants. The amount retained by stems, (mostly in the leaf axils), did not differ significantly between wet and dry plants. When a wet plant was shaken gently, some granules were lost from the leaves and accumulated in the whorl, the amount remaining on the leaves was still significantly greater than that initially retained by dry leaves. Rain falling from directly above the plant also resulted in a loss of granules from the leaves and a corresponding increase in the amount held in the central whorl; there was also an increase in the amount of granules in the leaf axils after shaking and rain.
The general conclusion was that after wind and rain little loss of granules occurred and the majority of those present on the leaves found their way into the central whorl. - J.W.F. [444(42)]

379. WALKER, P.T. and SELWAY, M.L. (Col. Pest. Res. Unit, Porton, Salisbury, England). The rate of break-up of granules, as used for the insecticidal control of maize stalk borer. C.P.R.U. Porton, Rep.No. 181, 1960, pp.3, figs.1, bibl.5.
A method is described in which 1 g of each of 2 grades of unimpregnated Attaclay granules were shaken with 20 ml of water for periods of 0.1 to 10 hours. Their rates of break-up were compared by filtering the mixtures through a series of B.S. sieves. After shaking for 3 hours, both grades reached a constant degree of disintegration.
Absorption of endrin at a strength of 1% is believed to cause some difference in

rate of break-up. From the results of these tests, it is considered that a constant degree of disintegration might be obtained inside the maize leaf whorl within 1.5 days of granules being applied. - J.W.F. [445(42)]

380. SWEDEN, SKOGEN. Ny typ av ogräs-rensare. [New type of weeder.] Skogen, 1960, 47,(9),192, (Sw.)
Describes, with an illustration, a weeder for use with a tractor, in which the blades rotate in the horizontal instead of the vertical plane. A speed of 400-500 r.p.m. gave the most effective cleaning. - For. Abstr., 1960, 21,4321.

381. CURLEY, R.G. (Univ.California,Davis, U.S.A.) Comparison boom and broadcast sprayers. Proc.12th ann.Calif.Weed Conf., 1960, 104-8, figs.3.
During 1956, a series of tests was made to compare boom and broadcast sprayers, which distribute the material from a cluster of nozzles. The tests showed that, except in optimum conditions of windlessness, boom sprayers gave a better coverage and distribution. - P.C. [O.W.]

382. HARGNSKA, G. Genossenschaftliche Pflanzenschutz-Gerätefibel. [Federal primer of plant protection apparatus.] Publ.Dtsch. Raiffeisen-Warenzentrale,GmbH., 1960, pp.112.
A list and description is given of apparatus currently used for the application of herbicides, insecticides and fungicides to crops. Flame gun control is included. - P.C. [O.W.]

383. KOCH, H. Biol.Bundesanstalt, Inst. Geräteprüfung,Braunschweig,Germany). Anerkannte Pflanzenschutzgeräte und geräte-teile. [Recognised plant protection apparatus and parts.] Nachrichtenbl.Deutsch. Pflanzenschutz.(Braunschweig), 1960, 12 (4),145-60, figs.16.
A number of trailer and knapsack sprayers recently tested are described, and detailed specifications of components and performance given. - P.C. [O.W.]

384. DUMMEBEIL, H. (Leipzig W 31,Karl-Heine-Str.90,Germany). Die in der DDR zur Unkrautbekämpfung einsetzbaren Pflanzen-schutzgeräte. [Plant protection apparatus used for weed control in East Germany.] Proc.Weed Conf.zent.biol.Anstalt,Berlin 1959. 73-80, (G.russ.e.) figs.8,tabs.1.
A list is given of implements which may be used for applying various types of herbicides with indications of their advantages and disadvantages for contact and growth regulator herbicides. - P.C. [O.W.]

385. EDWARDS, R.W. and BROWN, M.W. (Water Pollution Res.Lab.,Stevenage,Herts.,England). An aerial photographic method for studying the distribution of aquatic macrophytes in shallow waters. J.Ecol., 1960, 48,161-3, figs.3,tabs.1,bibl.1.
A method of aerial photography is described in which an electrically operated camera is suspended from a balloon filled with hydrogen and secured at a constant height above the water. - J.W.F. [439(42)]

PHYSIOLOGY, MORPHOLOGY AND ANATOMY

386. CRAFTS, A.S. (Univ.California,Davis, U.S.A.) Uptake and distribution of herbicides. Proc.12th ann.Calif.Weed Conf., 1960, 92-5.
A brief statement of the mode of action of the translocated herbicides 2,4-D, IAA, amitrole, MH and dalapon. - P.C. [O.W.]

387. RADWAN, M.A., STOCKING, C.R. and CURRIER, H.B. (Bot.Dep.Univ.California,Davis. U.S.A.) Histoautoradiographic studies of herbicidal translocation. Weeds, 1960, 8,(4) 657-65, figs.13,tabs.1,bibl.10.
The cellular distribution of amitrole and 2,4-D labelled with ^{14}C was studied in beans using histoautoradiographic methods. The herbicides were applied to both leaves and roots. Subsequent activity was always in the phloem of leaf-treated plants, and more rarely in the xylem. As the distance from point of application increased, the activity in the phloem decreased and that in the xylem increased. In root-treated plants, the relative activity in xylem and phloem was greater in the xylem than in the phloem. These results suggested a lateral transfer between xylem and phloem for both leaf- and root-treated herbicides. - P.C. [O.W.]

388. BLACKMAN, G.E., SEN, G., BIRCH, W.R. and and POWELL, R.G. (Dep.Agric.,Univ.Oxford, England). The uptake of growth substances.

1. Factors controlling the uptake of phenoxyacetic acids by Lemna minor. J.exp. Bot., 1959, 10,33-54, figs.14,tabs.1, bibl.18.
The rate of uptake of 2,4-D by Lemna minor from solutions of 8 to 32 mg/l was maximal in the first 20 minutes and then fell progressively to zero after 1-2 hours. In a third phase, up to 24 hours, there was a net loss from the plants due to an outward movement of 2,4-D back into the external solution. Loss occurred after combinations of concentration and time of exposure which caused no permanent retardation of growth. A detailed study of the physiology of these processes was made, including comparisons with 2,6-dichlorophenoxyacetic acid, 2-chlorophenoxyacetic acid and phenoxyacetic acid. - C.C.McCready.
[O.RE.]

389. BRIAN, R.C. (I.C.I.Ltd.,Jealott's Hill Res.Sta.,Bracknell,Berks,England). Action of plant growth regulators. III. Adsorption of aromatic acids to oat monolayers. Plant Physiol.,1960, 35,(6), 773-82, figs.11,tabs.6,bibl.9.
The possibility is investigated of the biological activity of compounds on a given plant species also being limited by their adsorption to sites not concerned in the physiological response. A physical measurement of the adsorption of a series of chloro- and methylphenoxy and phenyl acetic acids and benzoic acids to monolayers from squashes prepared from oat leaves is reported, the results of which indicate how the acids are adsorbed and in what relative quantities. - From Author's Summary. - J.W.F. [O.W.]

390. LICHTENSTEIN, E.P. and SCHULZ, K.R. (Dep.Entom.,Univ.Wisconsin,Madison,U.S.A.) Translocation of some chlorinated hydrocarbon insecticides into the aerial parts of pea plants. J.agric.Fd Chem., 1960 18, (6),452-6, tabs.3,bibl.18.

391. SCHRANK, A.R. (Dep.Zool.,Univ. Texas,Austin,U.S.A.) Differential effects of 2,3,6-trichlorobenzoic acid on growth and geotropic curvature of Avena coleoptiles. Plant Physiol., 1960, 35,(5),735-41, figs.8,bibl.15.
The results of experiments on the effect of 2,3,6-TBA on the elongation, geoteopism and phototropism of apical segments of Avena coleoptile are interpreted as indicating that 2,3,6-TBA inhibits the geotropic perception mechanism. - M.H. [O.W.]

392. DUBROVIN, K.P. (Spencer Chem.Co., Kansas City,Missouri,U.S.A.) Mitotic effects of Carbyne [barban] on wheat and wild oats. Proc.7th ann.Meet.agric.Pest. Tech.Soc.[Canada], 1960, 88-95. [O.W.]

393. * McMAHON, R.M., WITKUS, E.R. and BERGER, C.A. Some cytological characteristics of 2,4-D-induced mitosis in polyploid cells of Solanum tuberosum L. Caryologia, 1959/60, 12,(3),398-403.

394. SUNDERLAND, N. (John Innes Institute, Bayfordbury,Herts.,England). The production of the Striga and Orobanche germination stimulants by maize roots. 1. The number and variety of stimulants. J.exp.Bot., 1960, 11,(32),236-45, figs.5,bibl.9.
Extracts of maize roots, and aqueous solutions in which roots had been suspended, contained a complex of substances which stimulated the germination of Orobanche and Striga seeds. The properties and inter-relations of these stimulants are discussed. The effects of some of them were greatly enhanced if a trace of the diffusate solution from linseed roots was added to them. - C.C.McCready.
[O.RE.]

395. SUNDERLAND, N. (John Innes Institute, Bayfordbury,Herts.,England). The production of the Striga and Orobanche germination stimulants by maize roots. 2. Conditions of synthesis in the root. J.exp.Bot., 1960, 11,(33),356-66, figs.10,tabs.2,bibl.5.
Segments excised from different zones of maize roots were compared with respect to their initial content of germination stimulants and their release of stimulants into culture solutions. Sugars stimulated and prolonged the synthesis of the stimulants by root segments in vitro. - C.C.McCready. [O.RE.]

396. CORNS,W.A. (Univ.Alberta,Edmonton, Canada). Effects of gibberellin treatments on germination of various species of weed seeds. Canad.J.Plant Sci., 1960, 40,(1), 47-51, bibl.6.
Seeds of Avena fatua, Sinapis arvensis, Thlaspi arvense, Lappula echinata and Galeopsis tetrahit were soaked in aqueous

500 or 1000 p.p.m. a.e. potassium gibberellate for 24 hours or 7-10 days. Dormancy was broken in S. arvensis and T. arvense and partly in L. echinata and G. tetrahit. Germination of A. fatua was increased in some cases. - Herb.Abstr., 30,1694.

397. CHOUARD, P. and LOURTIOUX, A. (Physiol.Veg.,Sorbonne,Paris,France). Contribution a l'etude des reactions de croissance des pois nains sou l'action combinee de la gibberelline et d'auxines et d'anti-auxines. [Contribution to the study of reactions in the growth of dwarf peas under the joint effect of gibberellin, auxins, and anti-auxins.] Bull.soc.franc. Physiol.veg., 1958, 4,(3),98-100, (F.)

398. FREDRICK, J.F. and GENTILE, A.C. (Res.Labs.,The Dodge Chem.Co.,New York 69,New York,U.S.A. Preliminary studies of infra-red spectra of 3-amino-1,2,4-triazole and its derivatives. Phyton, 1960, 15,(1), 1-6, figs.5,bibl.9.
Spectrographic evidence is presented to show that the so-called glucose "Adduct" of amitrole, which affects the phosphorylase and hexokinase enzyme systems of plants, is a definitive compound. Its proposed structure is 3-amine glucosido-1,2,4-triazole. - P.J.B.

399. FREDRICK,J.F. and GENTILE, A.F. (Res. Labs.,The Dodge Chem.Co.,New York 69,New York,U.S.A.) The effect of 3-amino-1,2 4-triazole on phosphorylase of Oscillatoria princeps. Arch.Biochem.Biophys., 1960, 86,30-3, figs.3,tabs.2,bibl.16.
The inhibitory effect of amitrole on O. princeps phosphorylase was attributed to chelation by amitrole of the essential metal required by this enzyme. The inhibition could be reversed by adding Mn or Fe ions only in the concentrations required for forming bivalent and trivalent chelates. - From Summary. - P.J.B.

400. FREDRICK, J.F. (Res.Labs.,The Dodge Chem.Co.,New York 69, New York,U.S.A.) The stability constant of the manganese chelate of 3-amino-1,2,4-triazole. Arch. Biochem.Biophys., 1960, 91,(2),178-81, figs.2,tabs.2,bibl.16.

401. * GUERRUCI, N. and ROTINI, O.T. Plant growth in presence of hippuric acid, benzoic acid and glycine. Ric.sci., 1960, 30, 842-8.

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The subject is discussed mainly from the point of view of the relation between

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Fully-imbibed seeds of tomato and Amaranthus retroflexus were placed in containers and exposed to the following: (a) 1,3-dichloropropene and (b) SMDC, each at concentrations ranging from 2.6 to 220 mg/l air; (c) chloropicrin at concentrations ranging from 22 to 220 mg/l, and (d) allyl alcohol at 0.35 0.7, 1.3 and 2.6 mg/l air. Exposure times ranged from 0.5 to 4 hours for (a) and (b), from 4 to 12 hours for (c) and from 1 to 4 hours for (d). Seed kill percentages showed that close relationship existed between duration of exposure and concentration of fumigant. Complete kill was secured by a short exposure to a high concentration of fumigant, or a long exposure to a low concentration of fumigant. Allyl alcohol was the most toxic, followed by 1,3-dichloropropene, SMDC and chloropicrin. The mode of entry of the fumigants into the seed could not be determined. - P.J.B. [O.W.]

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Woody weeds. Lippia ukambensis and Aspilia asperifolia were treated at 2-monthly intervals during 1960 with 2,4-D ester and 2,4,5-T ester, each alone or as a mixture at 2 %. Best control of both species followed treatment in May (late long rains).
Herbaceous weeds. Good control of Cyperus rotundus followed the incorporation of EPTC at 4 or 8 # into a very dry soil in February, 1 month before the long rains. Argemone mexicana was controlled by 2,4-D amine 2 # post-em. when applied to plants not more than 3 in. high.
Weeds in crops. Of herbicides tested with young and mature coffee, only EPTC and simazine have so far caused no damage. Simazine, atrazine and a methylmercapto triazine (G.32360) were applied pre-em. to maize with a logarithmic sprayer. The lowest dosages giving economic weed control were 1.25, 1 and 1.5 # respectively, and the crop tolerated rates up to 5 # of each herbicide. Raking the herbicides into the

top in. of soil did not affect the results. In trials with dwarf French beans, no damage was caused by rates of Simetryne (2-methylmercapto-4,6-bis(ethylamino)-s-triazine up to 4 # and atrazine and simazine at rates up to 2.75 # pre-em.; economic weed control was given by rates of 1.75 and 1.5 #, respectively. Amiben at 0.5-8 # was ineffective and caused crop damage. 2,4-DB at 2-4 # and dinoseb 4-8 # pre-em. gave moderate to good weed control with no crop damage. Pre-em. treatment of cotton with simazine 2 # and atrazine 5 # killed the crop while Simetryne 5 # caused only slight damage. Weed control with all 3 herbicides was excellent for 6 weeks after treatment, though Simetryne was the least effective. - P.J.B. [O.W.]

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List of Common Names and Chemical Abbreviations

The following list, based on that adopted by the Weed Society of America, has been approved by the British Weed Control Council, except for those marked □.
An asterisk (*) signifies common names approved by the B.S.I.
A plus sign (+) signifies approval by the Weed Society of America.

amiben □+	3-amino-2,5-dichlorobenzoic acid
amitrole □+	3-amino-1,2,4-triazole
AMS □+	ammonium sulphamate
atrazine □+	2-chloro-4-isopropylamino-6-ethylamino-1.3.5-triazine
barban □	4-chloro-2-butynyl-N-(3-chlorophenyl)carbamate
CDAA +	2-chloro-NN-diallylacetamide
CDEA +	2-chloro-NN-diethylacetamide
CDEC +	2-chloroallyl-NN-diethyldithiocarbamate
chlorpropham *	isopropyl-N-(3-chlorophenyl)carbamate
4-CPA +	4-chlorophenoxyacetic acid
4-CPB	4-(4-chlorophenoxy)butyric acid
2,4-D +*	2,4-dichlorophenoxyacetic acid
3,4-DA +	3,4-dichlorophenoxyacetic acid
dalapon +*	2,2-dichloropropionic acid
2,4-DB *	4-(2,4-dichlorophenoxy)butyric acid
DCU □+	dichloralurea
2,4-DEB +	2,4-dichlorophenoxyethyl benzoate
2,4-DES *	2,4-dichlorophenoxyethyl hydrogen sulphate
dichlone +*	2,3-dichloro-1,4-naphthoquinone
dinosam *	2-s-amyl-4,6-dinitrophenol
dinoseb *	2-s-butyl-4,6-dinitrophenol
diquat +*	1,1'-ethylene-2,2'-dipyridylium dibromide
diuron +*	N-(3,4-dichlorophenyl)-N'N'-dimethylurea
DMTT □+	3,5-dimethyltetrahydro-1,3,5,2H-thiadiazine-2-thione
DNOC *	2-methyl-4,6-dinitrophenol or 3,5-dinitro-o-cresol
2,4-DP	2-(2,4-dichlorophenoxy)propionic acid
endothal +	3,6-endoxohexahydrophthalic acid
EPTC □+	ethyl-NN-dipropylthiolcarbamate
erbon +	2-(2,4,5-trichlorophenoxy)ethyl-2',2'-dichloropropionate
fenac □+	2,3,6-trichlorophenylacetic acid
fenuron +*	N-phenyl-N'N'-dimethylurea
ipazine □+	2-chloro-4-diethylamino-6-isopropylamino-1,3,5-triazine
MCPA +*	4-chloro-2-methylphenoxyacetic acid
MCPB *	4-(4-chloro-2-methylphenoxy)butyric acid
MCPES +	sodium 4-chloro-2-methylphenoxyethyl sulphate
mecoprop *	dl 2-(4-chloro-2-methylphenoxy)propionic acid
MH □+	maleic hydrazide
monuron +*	N-(4-chlorophenyl)-N'N'-dimethylurea
neburon +	N-(3,4-dichlorophenyl)-N'-butyl-N'-methylurea
NPA +	N-1-naphthylphthalamic acid
PCP +	pentachlorophenol
PMA +	phenylmercuric acetate
propazine □+	2-chloro-4,6-bis(isopropylamino)-1,3,5-triazine
propham *	isopropyl-N-phenylcarbamate
simazine +*	2-chloro-4,6-bis(ethylamino)-1,3,5-triazine
SMDC □+	sodium methyl dithiocarbamate
2,4,5-T +*	2,4,5-trichlorophenoxyacetic acid
2,4,5-TB	4-(2,4,5-trichlorophenoxy)butyric acid
2,3,6-TBA +	2,3,6-trichlorobenzoic acid
TCA +	trichloroacetic acid
2,4,5-TES +	sodium 2,4,5-trichlorophenoxyethyl sulphate
2,4,5-TP	2-(2,4,5-trichlorophenoxy)propionic acid
trietazine □+	2-chloro-4-diethylamino-6-ethylamino-1,3,5-triazine
3Y9 □	tris-(2,4-dichlorophenoxyethyl)phosphite

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